Environmental Aspects & Impacts

A system for identifying priorities and setting goals

By David Ayers

As companies become more socially conscious, SH&E professionals are often assigned environmental responsibilities as well as safety responsibilities. The modern environmental movement in the U.S. is closely associated with the 1962 publication of Rachel Carson’s *Silent Spring*. “Rachel Carson meticulously described how the pesticide DDT entered the food chain in the fatty tissues of animals, including human beings, and caused cancer and genetic damage” (NRDC, 2008).

In 1969, Congress declared in Sec. 101 of the National Environmental Protection Act (42 USC § 4331):

> [I]t is the continuing policy of the federal government, in cooperation with state and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans.

The more recent green movement and the trend toward corporate social responsibility indicate that many companies are listening to stakeholders who want clean, efficient operations that are protective of the environment. Many companies are finding that such operations not only protect the environment but also help the companies save money. This creates a win-win situation in which operations are analyzed for environmental performance and a cost savings is realized by reducing waste. Waste costs time and money, not only in its disposal, but also in its production in the first place.

Several environmental management systems (EMS) have been published, most notably ISO 14001. This standard is designed to help firms manage their environmental responsibilities to all applicable regulations through an effective EMS. Whether a company pursues ISO 14001 or creates a custom version, a system to manage the company’s environmental responsibilities is important.

Elected to use an EMS is the first step toward addressing environmental affairs in a proactive way. First, the company should have an environmental policy. This is an overall document that explains what the company intends to do from an environmental standpoint. The environmental policy statement should show management commitment, be easy for employees and the public to understand, and reflect the company’s vision and values.

This article examines how SH&E professionals with environmental responsibilities can identify environmental aspects and impacts, and introduces a scoring system that can be used to determine environmental priorities, then set measurable environmental goals.

Environmental Aspects

According to clause 3.3 of ISO 14001:2004, an environmental aspect is any “element of an organization’s activity, products or services that can interact with the environment.” Goetsch & Davis (2001) state:

In simple terms an environmental aspect is anything resulting from the organization’s activities, products or services that has the poten-
Environmental Impact

In cause and effect, if one considers an environmental aspect to be the cause, then the environmental impact is the effect. An environmental impact is any change to the environment, whether adverse or beneficial, wholly or partially resulting from the organization’s activities, products or services. Essentially, the environmental impact is the result of the environmental aspect.

For example, suppose a company is discharging wastewater to a nearby stream. A potential environmental impact of that activity is pollution to the water. Table 1 (p. 27) presents some practical examples of aspects and impacts from a ready mixed concrete facility.

Abstract: SH&E professionals with environmental responsibilities can use a scoring system to identify environmental aspects and impacts, determine priorities and set measurable goals for reducing a company’s impact on the environment.

The trend toward corporate social responsibility indicates that many companies are listening to stakeholders who want clean, efficient operations that are protective of the environment.
Examine Company Operations: Form a Multidisciplinary Team

Examining a company’s operations helps one determine what environmental aspects/impacts it produces. One way to start this process is to form a team. Team members should bring different attributes to the group to allow for a holistic solution. Table 2 lists some potential team members and their contributions (EPA, 1999).

Once the team is formed, it must select a method to document and track progress. Many different strategies exist for selecting which area to address first. One area to be addressed should be all permitted and regulatory areas to ensure that a company is operating legally.

Example Scoring System

A numerical scoring system can be used to identify a company’s top 5% environmental aspects/impacts that will be addressed. By addressing the top 5%, the company will show continuous improvement. As aspects and impacts are addressed, scores will be lower.

Following is an example rating formula (modified and adapted from original National Semiconductor Texas formula) to help prioritize environmental aspects and impacts.

\[
\text{(Probability} \times \text{Consequence)} + \text{Regulatory Requirements} + \text{Concerns to Customers or Community} \times \text{Resource Requirements} = \text{Total Score}
\]

**Probability: How Often Does the Aspect Occur?**

- 5: routine; impact can occur through everyday operations;
- 4: periodic; impact can occur at regular intervals more than once/year;
- 3: occasional; impact can occur at a frequency not more than three times in 5 years;
- 2: possible; impact not expected at this plant, but could still occur;
- 1: limited; impact not expected at this plant; control system designed to control or minimize impact.

**Consequences: What Is the Environmental Consequence of the Aspect/Impact?**

- 5: extreme; results in severe, disruptive or persistent ecological damage or impacts to human health;
results in large-scale nonrenewable uses of energy, water or other natural resources;
4: high; results in uncontrolled emissions to air, water or land or measurable impacts to human health; results in significant use of energy, water or other natural resources;
3: moderate; results in controlled emissions to air, water or land or potential to affect human health; use of natural resources reduced by energy conservation and waste reduction and recycling programs;
2: minor; minimal emissions to air, water or land; use of natural resources reduced by energy conservation or use of renewable resources, waste reduction and recycling programs and use of recycled materials in products produced by and materials used by the facility;
1: no consequence.

**Concerns to Customer or Community:**

**How Concerned Is the Customer or Community?**

3: extremely concerned;
2: very concerned;
1: mildly concerned;
0: not concerned.

**Resource Requirement Level: How Easy or Difficult Is It to Control the Aspect/Impact?**

5: very difficult to control; requires many resources;
4: difficult to control; requires many resources;
3: requires moderate resources to control;
2: requires some resources to control;
1: easily controlled; requires few measures.

Some of the formula inputs are easy to measure while others are more subjective. On occasion, the team will need to use its best judgment until enough data are available to change the category rating. Some companies also gather direct input from customers and from the communities in which they operate. This is a great strategy for showing residents how the company is handling environmental matters responsibly. However, remember that the public may be emotionally driven to remove some element (such as a toxic chemical, process or a step in the manufacturing process) that cannot be elim-

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### Example Aspect/Impact Tracking Sheet

<table>
<thead>
<tr>
<th>Activity</th>
<th>Task</th>
<th>Aspect</th>
<th>Environmental interaction. The way in which an activity, product or service can have an effect on the environment.</th>
<th>Operational controls</th>
<th>Impact</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water quality management</td>
<td>Process water discharge</td>
<td>Water</td>
<td>Water quality SOP, training, lined sedimentation pit, truck and chute wash down</td>
<td>Consumption of natural resources</td>
<td>N</td>
<td>5</td>
</tr>
<tr>
<td>Hazardous materials management</td>
<td>Petroleum and chemical usage</td>
<td>Used lubricants</td>
<td>Used oil SOP, training, spill kits</td>
<td>Used oil disposal</td>
<td>N</td>
<td>5</td>
</tr>
<tr>
<td>Air quality management</td>
<td>Airborne process emissions</td>
<td>Hot water boiler</td>
<td>Air quality SOP, air permit to operate, maintenance</td>
<td>Combustion by-products</td>
<td>N</td>
<td>5</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Recycling efforts</td>
<td>Aluminum cans</td>
<td>Recycling SOP</td>
<td>Recycled material disposal</td>
<td>N</td>
<td>5</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Recycling efforts</td>
<td>Wooden skids</td>
<td>Recycling SOP</td>
<td>Recycled material disposal</td>
<td>N</td>
<td>5</td>
</tr>
<tr>
<td>Water quality management</td>
<td>Stormwater discharge</td>
<td>Water</td>
<td>SWPPP, training, sampling, process water and stormwater separation, stormwater permit</td>
<td>Stormwater runoff</td>
<td>N</td>
<td>5</td>
</tr>
<tr>
<td>Hazardous materials management</td>
<td>Spill prevention control and countermeasures (SPCC)</td>
<td>Diesel fuel</td>
<td>SPCC plan, training inspections, maintenance, adequate containment dike</td>
<td>Sample stormwater before discharging</td>
<td>N</td>
<td>5</td>
</tr>
<tr>
<td>Water quality management</td>
<td>Stormwater discharge</td>
<td>Water</td>
<td>SWPPP, no permit</td>
<td>Stormwater and process water runoff</td>
<td>U</td>
<td>5</td>
</tr>
<tr>
<td>Air quality management</td>
<td>Airborne process emissions</td>
<td>Bag house</td>
<td>Air quality SOP, air permit to operate, maintenance</td>
<td>Uncontrolled air emission</td>
<td>U</td>
<td>5</td>
</tr>
<tr>
<td>Water quality management</td>
<td>Process water discharge</td>
<td>Water</td>
<td>Water quality SOP, training</td>
<td>Process water spill on land or water</td>
<td>U</td>
<td>4</td>
</tr>
<tr>
<td>Hazardous materials management</td>
<td>Spill prevention control and countermeasures</td>
<td>Diesel fuel delivery</td>
<td>SPCC plan, diesel fuel delivery SOP</td>
<td>Diesel fuel spill to land or water</td>
<td>U</td>
<td>3</td>
</tr>
</tbody>
</table>

*Note: Adapted from National Semiconductor—Texas environmental aspects/impacts matrix. Actual tracking sheet would include a comments field.*
Several selection strategies exist. One effective approach is to focus on regulatory items first, then company policies and finally voluntary aspects.

In addition, the team should ask management representatives how they would like to see these issues addressed. However, what if the management team wants the team to determine the environmental priorities? One simple strategy is to follow the money. Where does the company spend the most money and on what items? An often overlooked and valuable resource is the accounting or finance department. This group pays the bills and often has metrics and data to provide a starting point.

Management by walking around (MBWA) is another strategy. Walk around the facility and observe the company in action. Perhaps the facility is water intensive or appears to use a lot of electricity. Look for areas of waste. Ask employees for their ideas. Environmental conservation contests are a great way to get valuable ideas and reward employees for examining their areas for waste.

After determining at least five environmental priorities, the team can present three to the management team for approval. The others can be held in reserve to be used if the management team does not approve the first choices. These other priorities also can be addressed at a later point if the first three priorities are completed before deadlines. However, it is best to focus on just three priorities so the team can measure progress toward goals.

### Setting Goals

Once the team identifies environmental priorities, it must set goals. The key to setting environmental goals is prevention of pollution. Prevention of pollution is the “use of processes, practices, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of resources and material substitution.” These goals are similar to those found in production and quality. They must be specific and measurable to be effective.

To ensure that goals are specific, ask the five key questions:

- **Who:** Who is on the team?
- **What:** What do we want to accomplish?
- **Where:** Where is the concern (can be an area of the plant or entire plant)?
- **When:** By when should this be accomplished (starting and ending)?

### Table 3

<table>
<thead>
<tr>
<th>Area</th>
<th>Goal</th>
<th>% Change</th>
<th>Personnel</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water use</td>
<td>Increase use of recycled water</td>
<td>10%</td>
<td>Plant manager, Smith, accountant</td>
<td>Water bill, water meter on sedimentation pit, gallons/yd² concrete produced</td>
</tr>
<tr>
<td>Sustainability/carbon footprint reduction</td>
<td>Plant 30 pine tree saplings along north fence</td>
<td>50%</td>
<td>Smith, SH&amp;E intern</td>
<td>Count trees</td>
</tr>
<tr>
<td>Returned concrete</td>
<td>Install concrete reclaimer and recycle 50% of returned concrete</td>
<td>50%</td>
<td>Plant manager, SH&amp;E intern, Jones, accountant</td>
<td>Track % of returned concrete, track cost savings on virgin aggregate</td>
</tr>
<tr>
<td>Paper</td>
<td>Reduce paper usage in copiers</td>
<td>25%</td>
<td>Plant manager, IT intern</td>
<td>Actual paper used in copier</td>
</tr>
<tr>
<td>Solid waste management</td>
<td>Reduce solid waste tonnage</td>
<td>10%</td>
<td>Plant manager, facility manager, SH&amp;E intern</td>
<td>Solid waste bill, lbs. of trash</td>
</tr>
<tr>
<td>Electricity usage</td>
<td>Reduce electricity usage</td>
<td>10%</td>
<td>Plant manager, facility manager</td>
<td>Electrical bill, kW/widget produced</td>
</tr>
<tr>
<td>Used drums</td>
<td>Eliminate steel drums being cut up and thrown in dumpster</td>
<td>100%</td>
<td>Plant manager, facility manager, purchasing department</td>
<td>Drum reclaimer weekly ticket</td>
</tr>
<tr>
<td>Wooden skids</td>
<td>Eliminate wooden skids thrown in dumpster</td>
<td>90%</td>
<td>Plant manager, facility manager, purchasing department</td>
<td>Skid reclaimer weekly ticket</td>
</tr>
</tbody>
</table>

The team also must ensure that each goal is measurable. Ideally, the goals should be communicated to employees, and department managers should be able to explain to employees how the environmental goal affects them and what they can do to contribute to success.

### Table 3 Examples of Specific, Measurable Goals

The team also must ensure that each goal is measurable. Ideally, the goals should be communicated to employees, and department managers should be able to explain to employees how the environmental goal affects them and what they can do to contribute to success.
• Why: What is the reason(s), purpose or benefit(s) of accomplishing this goal? (Meyer, 2007).

Answering the why question is critical. Employees, supervisors and managers may ask why they should help with the environmental goals. Having others agree that goals are important leads to buy-in. Without management and employee buy-in, some progress is possible, but the goal may never be met or exceeded. In addition, specific goals show others that the team has developed a well thought-out plan and measurement system.

As long as the team can answer the W questions, it will have specific goals (Meyer, 2007). A specific goal may sound something like “ABC Concrete will reduce paper usage in printer/copiers by 25% by Dec. 31, 2010, by setting the copier mode to always print double-sided. Also, reinforce with the workforce to only use printers/copiers when necessary.” A general or nonspecific goal may sound something like “ABC Concrete will reduce paper usage by 25%.” A specific goal sets into motion a plan to achieve substeps along the way with a specific ending date and goal measurement.

The team also must ensure that each goal is measurable. To do this, the team establishes criteria against which to measure progress. Ask questions such as: How many? How much? How will we measure progress and know that we are done (or falling behind schedule)? (Meyer, 2007).

The first step is to make sure the goal can be measured. For example, it will be difficult to quantify the gallons of water saved per cubic yard of concrete produced if there is no way to measure baseline water use first. Make sure the company can measure progress per a fixed unit and not along a floating baseline such as dollars saved per widget produced. A fixed unit goal can state “amount of (electricity in kW, gallons of water, hazardous waste produced or solid waste produced) per widget produced.” This way the company can measure progress even if the cost of waste disposal, water and electricity increases.

Table 3 presents several examples of specific and measurable goals. Ideally, the goals should be communicated to employees, and department managers should be able to explain to employees how the environmental goal affects them and what they can do to contribute to success.

The company also must have a system to communicate progress and goal status. Environmental goals such as those listed in Table 3 will pay for themselves over a given period. This payback period will vary depending on the goals, and may not always be in the form of money. For example, the facility used as an example in Table 3 is planting 30 pine saplings along the north fence. This activity can be measured and included as part of the company’s annual report or it may just be a nice footnote to include in maintaining good community relations.

The company can involve outside parties in goal setting. For example, the team could research whether an outside group would like to be part of this effort while also helping the company achieve its environmental goals. Both groups profit in some way. For example, some companies collect paper and aluminum cans for youth group fundraising activities. Most companies devise a system where the outside parties collect the recyclables each week.

Such arrangements also can help with housekeeping. One company was being overrun by empty drums and wooden skids. General practice had been to throw skids in the dumpsters, while the drums were triple-washed then disposed of in the dumpsters. Realizing there might be a better way, the company contacted a drum reclamer and wooden skid reclamer. The reclamation firms came to the facility each week and removed the items for free. The company also saved a small amount of money by reducing the amount of solid waste weight in the dumpsters.

After going through these steps, suppose the company does not achieve its environmental goals. Reexamine the team’s steps. Perhaps the goals were too ambitious (which is okay as long as there was an effort to achieve them). Track progress at least weekly and meet as a team on a monthly or quarterly basis. Adjust strategy as necessary. Discuss options and chart a new path as the situation dictates.

The company also may find that after several years of setting environmental goals that it is difficult to achieve a goal such as a 2% reduction in something. As the company examines the processes and improves its processes, environmental goals will be more difficult to achieve. Capitalize on incremental goal achievement. If the company goal is to reduce paper usage by 25% and at the 6-month mark the data indicate a 20% reduction, communicate that status to employees.

Conclusion

SH&E professionals are being asked to take on more and more environmental responsibilities. Identifying environmental aspects and impacts as well as environmental goal setting and measurement may be among those responsibilities. There is no set system for doing this, but an EMS that easily blends into the existing company culture is an effective approach. Achieving environmental goals will pay off in dividends, not just monetarily but also with an enhanced reputation as the company operates in an environmentally friendly manner as possible and is a good neighbor to the community.

References


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