



# New Paths to Business Value

**STRATEGIC SOURCING —  
ENVIRONMENT, HEALTH AND SAFETY**



**GEMI**

# New Paths to Business Value

## STRATEGIC SOURCING — ENVIRONMENT, HEALTH AND SAFETY

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The Global Environmental Management Initiative (GEMI) is a non-profit organization of leading companies dedicated to fostering environmental, health, and safety excellence worldwide. Through the collaborative efforts of its members, GEMI also promotes a worldwide business ethic for environmental, health and safety management and sustainable development through example and leadership.

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## Preface

MARCH, 2001

**DEAR PROCUREMENT PROFESSIONALS:**

The members of the Global Environmental Management Initiative (GEMI) are proud to introduce this new guidance document, *New Paths to Business Value: Strategic Sourcing - Environment, Health and Safety*. Over the last ten years GEMI has developed a series of documents, reports and tools that help business achieve environmental, health and safety (EHS) excellence. This is the first document to systematically explore the importance of EHS issues to procurement decisions.

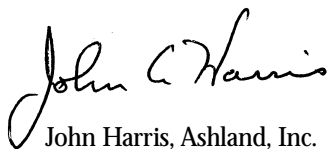
GEMI work products reflect the collective ideas and efforts of its 37 member companies representing 17 business sectors. For this study, EHS professionals of GEMI member companies worked with their procurement colleagues to better understand how EHS performance affects the business value of strategic sourcing. We concluded that by working together we can improve both EHS and financial performance in our companies. Companies that integrate EHS concerns in their strategic sourcing can create business value by:

- Reducing downtime, product life cycle cost and time to market;
- Minimizing risks and liabilities;
- Enhancing reputation and market share; and
- Reducing overall costs due to EHS considerations.


We recognize that EHS issues may not have historically ended up on your desk. But today, most goods and services you procure have an impact on the environment and/or the health and safety of your employees, customers or surrounding communities. These impacts can affect the total cost of goods and services, the quality of your products, your ability to conduct business and the reputation of your company. Greater awareness of these impacts can increase the business value of your procurement decisions.

We hope you will find this document stimulating and useful. Through the creation and expansion of partnerships between EHS and Procurement professionals we have an extraordinary opportunity to improve our EHS performance while also maximizing value for our companies. We welcome your comments on this guidance document and thank you in advance for taking the time to review what we believe is a unique business approach to Strategic Sourcing.

Sincerely,



John Harris, Ashland, Inc.



Dale Moore, Texas Instruments



Robert Sherman, Halliburton Company

Chairs of the GEMI's Service Provider Work Group

## Acknowledgements

This guidance document was developed in a collaborative process by the Global Environmental Management Initiative's (GEMI) Service Providers Work Group. John Harris (Ashland Inc.), Bob Sherman (Halliburton Company) and Dale Moore (Texas Instruments) directed the project. The document was written by David Cross and Jim Dray of ThermoRetec, with contributions from Helen Crowley, Sarah Friedman, Kristin Larson and Melissa Spear. GEMI staff contributing to this document included Steve Hellem, Mary Beth Parker and Amy Goldman.

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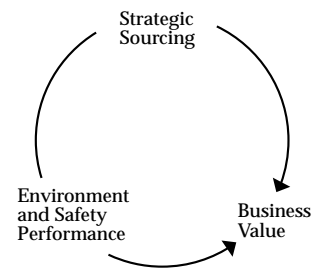
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# SUMMARY AND USER GUIDE

*This guidance document covers five topics related to business value, and the ways strategic sourcing can enhance it by improving the environment, health and safety (EHS) performance of products and suppliers.*



It also includes case studies detailing how different companies from a wide range of business sectors manage this integration and derive business value from it. This document:

- Illustrates how business value can be enhanced by adept management of EHS issues in the supply chain;
- Encourages a selective approach that is appropriate for each unique company and for different types of suppliers and supplier relationships;
- Provides practical resource for procurement staff, helping them understand and pursue business value opportunities that might otherwise be missed;
- Encourages dialogue and effective collaboration between procurement and EHS departments; and
- Steers companies toward practices that add business value.

The document was shaped by four premises that emerged from a year of discussions among GEMI members and their procurement colleagues.

- 1) Supply chain management of EHS issues will be increasingly important for many companies.
- 2) The potential business value - and the appropriate level and type of procurement effort - varies widely depending upon the industry, the company, its customers, and the level of supplier relationship. One size does not fit all.
- 3) Procurement departments can easily integrate EHS criteria into their existing tools and procedures. Procurement professionals are experts at evaluating suppliers and calculating costs. They already estimate total value taking into account both quantitative and qualitative factors. EHS professionals can help them effectively manage EHS issues and their business implications, and can help provide corporate support for moving in this direction.
- 4) Companies should be careful not to impose unnecessary requirements upon their suppliers.

Topics and case studies have been chosen to help you identify and pursue selected business value opportunities, with selected suppliers, using appropriate procurement tools. While the topics are complementary, each topic section has been composed as a stand-alone resource. Some material is therefore duplicated across two or more topics. While Topic One does provide an introduction, the remaining topics are not written to be read in any particular order.

*Each Topic is organized to answer a question.*

- **Topic One:** Is EHS an important source of business value in my supply chain?
- **Topic Two:** How do I find untapped business value in my supply chain?
- **Topic Three:** How can I use EHS criteria to add business value?
- **Topic Four:** How can I assess and improve supplier EHS performance?
- **Topic Five:** How can I improve EHS performance through outsourcing?

The Appendix includes recommended resources, a glossary, and a table summarizing the contributions that other corporate departments can make to a cost-effective supply chain management effort. The work group may electronically post additional reference material at [www.gemi.org](http://www.gemi.org).

Because this document intentionally emphasizes certain procurement challenges and opportunities, it does not provide even or complete coverage of all procurement tools or all ways that procurement can add value with regard to EHS performance. Redesign of products and processes (Design for Environment, or DfE) – often the most valuable way to improve EHS performance – has been left for another work group to explore. The importance of whole-system optimization in supply chain decisions, which requires an integrated multi-departmental planning effort, has been outlined but not explored in depth. Figure 1 shows which topics cover the different ways procurement adds business value relative to EHS performance.

**FIGURE 1. WAYS PROCUREMENT CAN ADD BUSINESS VALUE BY IMPROVING EHS PERFORMANCE, AND WHERE TO FIND THEM IN THIS DOCUMENT**

	Topic				
	1	2	3	4	5
● Denotes major coverage ⊙ Denotes minor coverage					
Adding supplier knowledge to product and process design decisions	⊙	⊙	⊙		⊙
Identifying new value options	⊙	●	⊙		●
Integrating supply chain criteria and planning across multiple departments	⊙		⊙		
Developing optimum specifications for inputs	⊙	⊙	●		
Selecting products, services, and suppliers with the best total value (quality and price)	⊙	⊙	⊙	●	●
Optimizing delivery schedules and in-coming logistics	⊙		⊙		
Assessing and improving supplier processes	⊙		⊙	⊙	
Assessing and strengthening supplier management	⊙		⊙	●	
Facilitating communication with collaborating suppliers	⊙		⊙	●	●



## TOPIC ONE

# Is EHS AN IMPORTANT SOURCE OF BUSINESS VALUE IN MY SUPPLY CHAIN?

*It is no secret to procurement professionals that skillful management of suppliers has become increasingly important to the corporate bottom line.*

It is also clear that some companies are adding environmental, health and safety (EHS) elements to strategic sourcing initiatives.

- Texas Instruments, Motorola, and General Motors subcontract on-site chemicals management to expert suppliers and share the savings that result.
- Procter & Gamble adds supplier experts to its planning teams to implement Design for Environment (DfE) to minimize the total costs and impact of a product through its life cycle.
- Halliburton is a service provider managing operations and risks for other companies; subcontractors are screened based on their safety performance record.
- Ashland's Specialty Chemical and Distribution Divisions perform site audits and track EHS performance for suppliers of high-risk products and services.
- Intel EHS staff provided free ergonomic awareness training to key equipment suppliers, so that supplier representatives will be more sensitive to these issues when they help design fabrication machinery for Intel.
- Bristol-Myers Squibb, IBM, and Xerox have encouraged their suppliers to develop environmental management systems consistent with ISO 14001. Ford, GM, and Toyota have required their suppliers to obtain ISO 14001 certification.
- Volvo calculates the environmental impacts associated with each car and extensively rates its suppliers' efforts to reduce those impacts. Both Kodak and Volvo have eliminated certain chemicals, and offer to help suppliers phase out their use.
- Several GEMI firms are paying millions to clean up sites of contract manufacturers that went bankrupt. Other GEMI members report business interruptions and legal expenses resulting from supplier mishandling of EHS requirements.
- Meanwhile, GEMI companies and their suppliers are being inundated by a burdensome number of long and fairly detailed questionnaires from customer companies concerning their EHS management systems and performance metrics.

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These examples, and others to be found throughout this guidance document, illustrate an exciting variety of procurement approaches, different types of business value, and some problems to avoid as EHS concerns grow in business importance. How can businesses secure the value they need from their supply chains, without collectively driving towards a future where hundreds of companies require thousands of their suppliers to obtain expensive certifications and report extensive information largely redundant with information they have already provided governments and other customers? That question is the motivation for this document.

The remaining pages in this section address four questions:

- What trends are forcing the procurement function to pay more attention to EHS performance criteria?
- What types of business value can be obtained from integrating EHS criteria in procurement practice?
- How does this potential business value vary across industries and suppliers?
- How do a company's strategic objectives influence the potential value of better EHS performance in the supply chain?

### *What trends are forcing the procurement function to pay more attention to EHS performance criteria?*

Most procurement departments will be adding more EHS criteria to product or service specifications. Many procurement departments will also add EHS performance and management criteria to their assessment of suppliers. These statements can be made with confidence due to the following trends:

***Growing pressure from customers, advocacy groups, investors and shareholders.*** Businesses, households and governments increasingly want to buy “green” products. Government purchasing agencies are “raising the bar” with new EHS specifications for products they buy. The market for environmentally friendly goods is over \$200 billion.<sup>1</sup> Business customers want reduced hazards. In addition, company behavior is becoming more “transparent” – meaning that many companies’ EHS performance is public (either voluntarily or not) and they cannot hide their risks by outsourcing them. An increasingly aware public holds companies accountable for the actions of their suppliers. Social investment portfolios include supplier efforts in screening. Increasingly companies are being held accountable for the companies they contract with to make their products.

***Changing regulatory landscape.*** U.S. companies already spend more than \$125 billion each year to comply with environmental regulations,<sup>2</sup> and regulatory constraints are increasing in many countries. Given the high costs of compliance, many businesses find value in proactively addressing potential regulations or using EHS excellence for competitive advantage.

***Expanding definitions of liabilities and risks.*** Definitions of product liability have been expanded. European nations have taken the lead in holding manufacturers responsible for the end-of-life impacts of their products. Liability is also being pushed back up the supply chain. Buyer companies have been held responsible for the Superfund liabilities left behind by bankrupt contract manufacturers. Thus manufacturers are increasingly liable for what happens all along the product life cycle, both before and after their work on a product is completed.

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(1) Ram Narasimhan and Joseph Carter, *Environmental Supply Chain Management*, Center for Advanced Purchasing Studies, 1998, pg. 10.

These trends increase the likelihood that an environment, health or safety improvement will have business benefits, and the likelihood that a safety or environmental risk will ultimately prove costly. In other words, these trends increase the number of EHS consequences that have important business value. This trend is shown in Figure 2. Since regulations, risks, and market pressure regarding EHS issues are likely to grow indefinitely, leading edge companies buy the best EHS performance they can afford. They also seek supplier allies that are committed to improving their own EHS performance.

**Proactive, strategic procurement.** Purchasing is evolving from transaction management toward more active engagement with other departments and a larger role in shaping design decisions and product specifications. Companies are using interdepartmental teams to optimize whole-system performance of the entire supply chain, integrating departments that would otherwise strive to maximize performance from their own perspective, thereby creating a sub-optimal result for the entire company. Systems approaches to supply chain management come in many flavors including “Six Sigma”, “Integrated Materials Management”, or “Proactive, Strategic Procurement”. Whatever the name, systems approaches to supply chain management have led to more detailed accounting of costs and produced dramatic cost reductions for

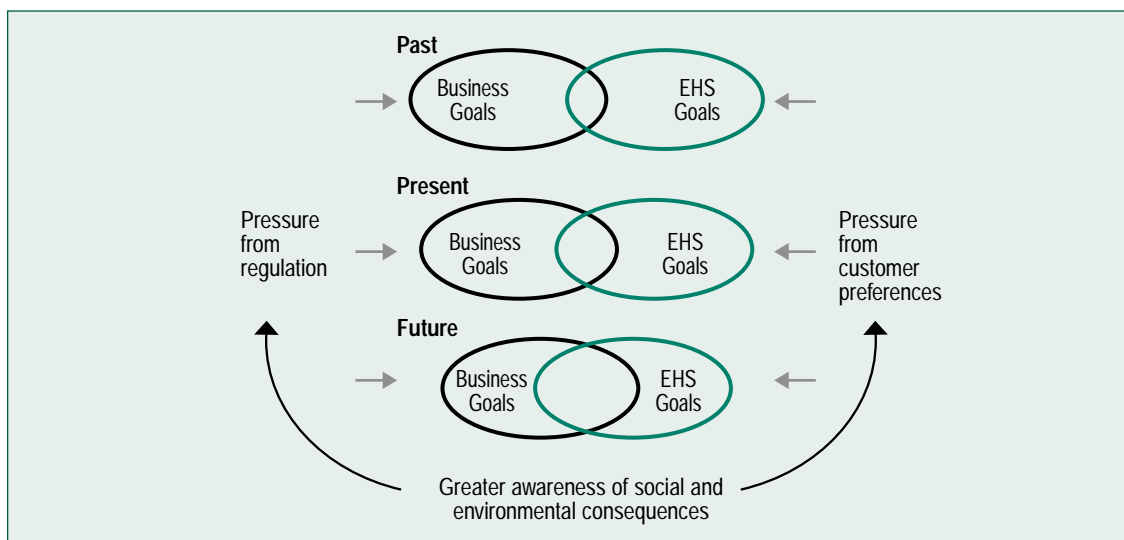
many companies. These endeavors are likely to discover new value opportunities for EHS improvements, and calculate costs related to EHS performance that had previously been hidden in other budgets.

**Outsourcing.** To better focus on their core competencies, companies are outsourcing the work of entire departments. A growing number outsource their manufacturing altogether. In this environment, adaptive companies tend to be those with a nimble, well-coordinated horizontal network of smart suppliers and subcontractors. This is particularly true when products are complex and product innovation cycles are short.

**Supplier consolidation and strategic sourcing.** By exerting corporate influence over facility level purchasing decisions, and by developing strategic partnerships with suppliers, companies have radically reduced the number of suppliers and gained more control over procurement costs.

Subcontract operations through outsourcing, make certain suppliers more critical, extend liability throughout the life cycle, and the result is a significant shift of corporate EHS risks and opportunities off site and beyond the direct control of the Environment, Health, and Safety Department. As a consequence, some of those business risks and opportunities may become Procurement’s responsibility.

FIGURE 2. INCREASING CONVERGENCE OF BUSINESS AND EHS GOALS



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## CASE STUDY — *ELI LILLY AND COMPANY*

### STRATEGIC SOURCING SAVES \$1 MILLION, REDUCES ACCIDENTS; COMPRESSED GAS CYLINDERS FOR RESEARCH LABORATORIES

Eli Lilly uses a single vendor to supply gas cylinders for their research labs. Originally, the vendor efficiently provided what Lilly asked of them. They took orders from a Lilly stores' clerk, delivered cylinders to a receiving dock and picked up empties from the same dock. Lilly personnel managed the gasses from that point on. There were on average 11 “touches” of the gas cylinders, about 1,000 cylinders “in inventory” and research scientists experienced about 2-3 accidents each year related to regulators or related gas equipment.

Lilly asked its vendor to develop an improved method for lab gas management; the vendor happily took on the challenge. The new system allows a scientist to place an order electronically directly with the vendor. The vendor then delivers the order directly to their lab. This results in only 1 “touch” of the cylinder by Lilly. On-site inventory of spare cylinders is down to about 12. The vendor provides regular usage and safety training and assists individuals with specific safety and usage questions at the time of delivery, if requested. There have been zero accidents due to lab gas usage in the past two years. Estimates have shown roughly \$1,000,000 per year of savings due to this program. ■



#### *STRATEGIC FOCUS*

If your strategic focus is on the costs of your operations, look for supplier EHS issues that may drive up supplier costs or suddenly disrupt supply, and look for supplier expertise that could help you cut the costs of your processes. If your strategic focus is on risk reduction, look at input quality issues that threaten your own performance, and look for supplier EHS impacts for which you might be held liable. If your focus is on reputation, look for potential problems in your supply chain that you can resolve before they hit the news.

**What types of business value can be obtained from integrating EHS criteria into procurement practice?**

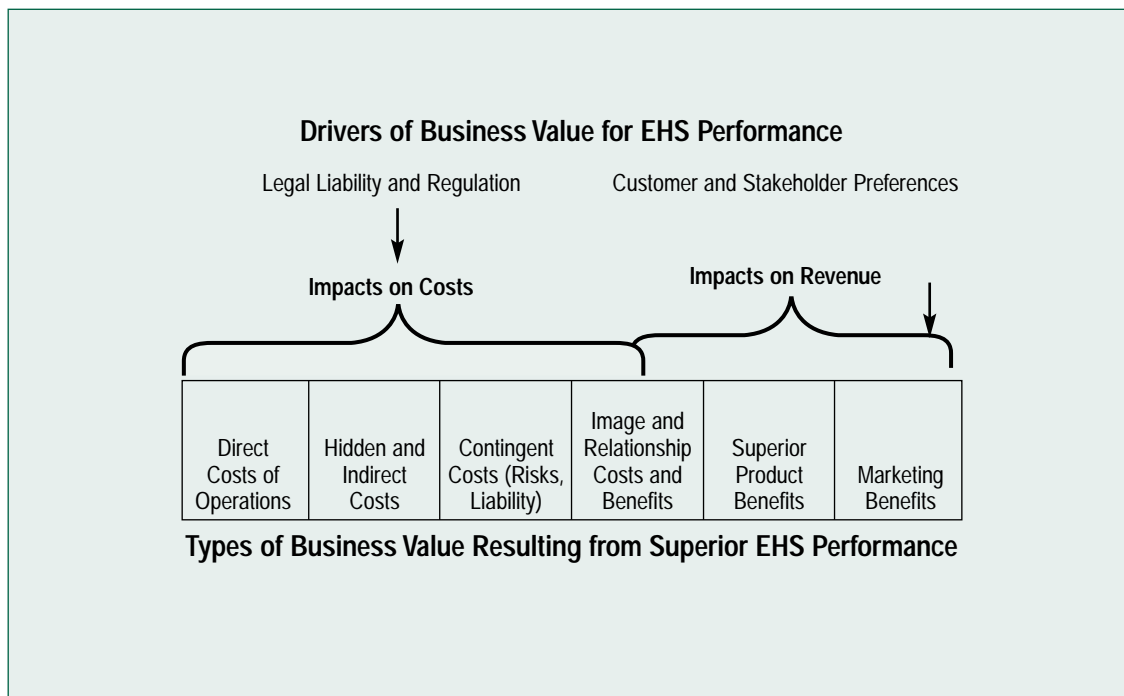
The business value that results from superior EHS performance of inputs and suppliers can usefully be divided into the six categories shown in Figure 3. The drivers of regulation, liability and market/stakeholder pressure were described as trends listed in the previous section. Procuring better EHS performance can have both bottom line impacts (reducing costs) and top line impacts (increasing revenues).

Direct costs of operations include the cost of purchasing inputs, and any expenses that are typically associated with their use in the supply chain. Hidden and indirect costs are buried in other budgets. These are often a very significant component of EHS-related business value potential. Typical hidden costs include training, protective equipment, insurance, storage, waste disposal, permitting, record keeping and inspections. Hidden

costs are predictable and routine, but rarely accounted for. Contingent costs are more visible, but they result from occasional events such as spills, accidents, and lawsuits. Reducing the odds of such events is another frequent goal for managing EHS issues in the supply chain. Relationship costs and benefits involve the perceptions of important stakeholders including employees, stock owners, Wall Street analysts, regulators, public interest groups, and customers. EHS improvements can be a product feature (e.g., ease of recycling, absence of toxins), or can indirectly allow for improved products.

Increasingly, customers are concerned with “pedigree” issues related to product origins. For example, were rainforests destroyed, rivers polluted or workers poisoned to produce it? How much carbon dioxide was emitted to make it? Pedigree features can increase product value and provide content for marketing campaigns. For instance, “Green” utilities can both attract attention and charge a premium when they offer to sell electricity generated with renewable sources of power.

FIGURE 3. TYPES OF BUSINESS VALUE, AND THEIR DRIVERS



Here is an example that moves from left to right across the value categories of Figure 3. In consultation with experts from the buyer company, a supplier improved its production process to produce a more uniform but still hazardous chemical, reducing its own production losses and hazardous waste disposal costs, resulting in a higher profit margin and lower direct cost to the buying company. In addition, the superior quality of the chemical reduced production interruptions, waste, waste disposal, and quality assurance costs for the buyer. All these are considered hidden costs, although the production interruption might also be considered a contingent cost. Since spills, skin contact, and permit violations are often linked to production interruptions and restarts, the more pure chemical also reduced the odds of expensive events (contingent costs) occurring. A more reliable and safer production line improved employee

perceptions of the company, resulting in more loyalty, reduced turnover and lowered training costs. Fewer permit violations also improved regulators' perceptions of the buyer company. These benefits involve image and relationship. Another result was a more consistent end product. This gradually led to a favorable review in an industry journal and more sales.

The four aspects of suppliers managed by procurement (input characteristics, transportation, supplier process, and supplier management) can all directly or indirectly impact business value, as shown in Figure 4. For each labeled cell in Figure 4 there are also real stories telling how business value was gained through better EHS performance from a purchased product, purchased service, or a supplier. (For more discussion, examples, and calculation methods, see Topics Two and Three).

FIGURE 4. PROCURED EHS PERFORMANCE: IMPACTS ON BUSINESS VALUE

		Types of Business Value					
		Impacts on Costs			Impacts on Revenue		
Procurement Variable		Direct Costs of Operations	Hidden and Indirect Costs	Contingent Costs (Risks, Liability)	Image and Relationship Costs and Benefits	Superior Product Benefits	Marketing Benefits
	<b>Purchases Input (product or service)</b>						
	EHS-related features	●	●	●	●	●	●
	Input "Pedigree"/origins	●			●	●	●
<b>Transportation/Delivery</b>							
	Transportation mode	●	●	●	●	●	●
<b>Supplier Process</b>							
	EHS impacts	●	●	●	●	●	●
<b>Supplier Organization</b>							
	Financial strength			●			
	Supplier expertise	●	●	●	●	●	●
	Supplier commitment	●	●	●	●	●	●

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### *How does this potential business value vary across industries and suppliers?*

Once business drivers and types of business value are understood, it becomes clear that different industries have quite different levels of business value at stake in EHS sourcing initiatives. If your customers do not care about environmental impacts, right-side columns of Figure 4 are zeroed out. If your processes are so benign that they encounter few EHS risks and regulations, the business value in the left side columns will approach zero. Because it cannot zero out these columns, the automobile industry is strongly motivated to manage EHS impacts in its supply chain. The industry attracts attention from many stakeholders including regulators concerned with gas mileage, emissions, and recovery of material from retired vehicles. Its processes involve many safety and environmental risks, and it relies on multiple first tier suppliers for a steady flow of components and for quick time to market.

As one step to improve environmental performance in their supply chains, Ford, GM, and Toyota have required thousands of suppliers to obtain ISO 14001 certification. Yet relatively few companies in other industries have looked beyond basic EHS product specifications to conduct EHS assessments of their suppliers' operations. In a 1997 survey, only 32% of procurement departments included environmental aspects in their assessment of supplier quality assurance capability.<sup>3</sup> This range of response suggests broad variation among industries in the value of managing EHS in strategic sourcing.

EHS impacts could be particularly important to your company for two often-related reasons.

1. Your industry could face relatively high risks and costs related to Environment, Health, and Safety. In other words, your company has – or its suppliers have – processes or products that can cause significant cost, harm and liability if not properly managed. These are internal drivers that affect the bottom line.

2. Your customers care about EHS performance and your market share depends in some measure upon your reputation. This market pressure is usually determined by the industry you are in, and by your customers' ease of substituting another company's product or service for your own. If your company has positioned itself as a leader in corporate EHS responsibility, you may be able to charge higher prices, but it is even more important to avoid publicity inconsistent with your desired reputation. Market pressure on your reputation is an external driver that affects the top line.

These two dimensions of exposure to EHS risk are shown in Figure 5 on the next page. Locating your company on this graph is extremely useful. It will indicate the magnitude of benefits your company could derive from investing effort in strategic sourcing. It will also indicate the relative importance of costs and reputation as guiding goals for a potential initiative.

The importance of EHS criteria also varies across suppliers, depending upon the input they supply, the amount of spending, and the type of relationship. GEMI companies keenly monitor waste disposers and on-site maintenance and construction subcontractors, regardless of size and spending level, because they can lead to great liabilities. Buyer-supplier relationships vary across a spectrum that can be summarized as follows (see more detail in Topic Three):

- **LEVEL 1:** Spot Purchasing depends largely on price, and the interdependency between buyer and supplier is minimal.
- **LEVEL 2:** Competitive incumbent relationships are in place for a longer period (typically a year), but involve relatively little substantive cooperation between the companies.

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(3) Narasimhan and Carter, Op. cit. pg. 12.

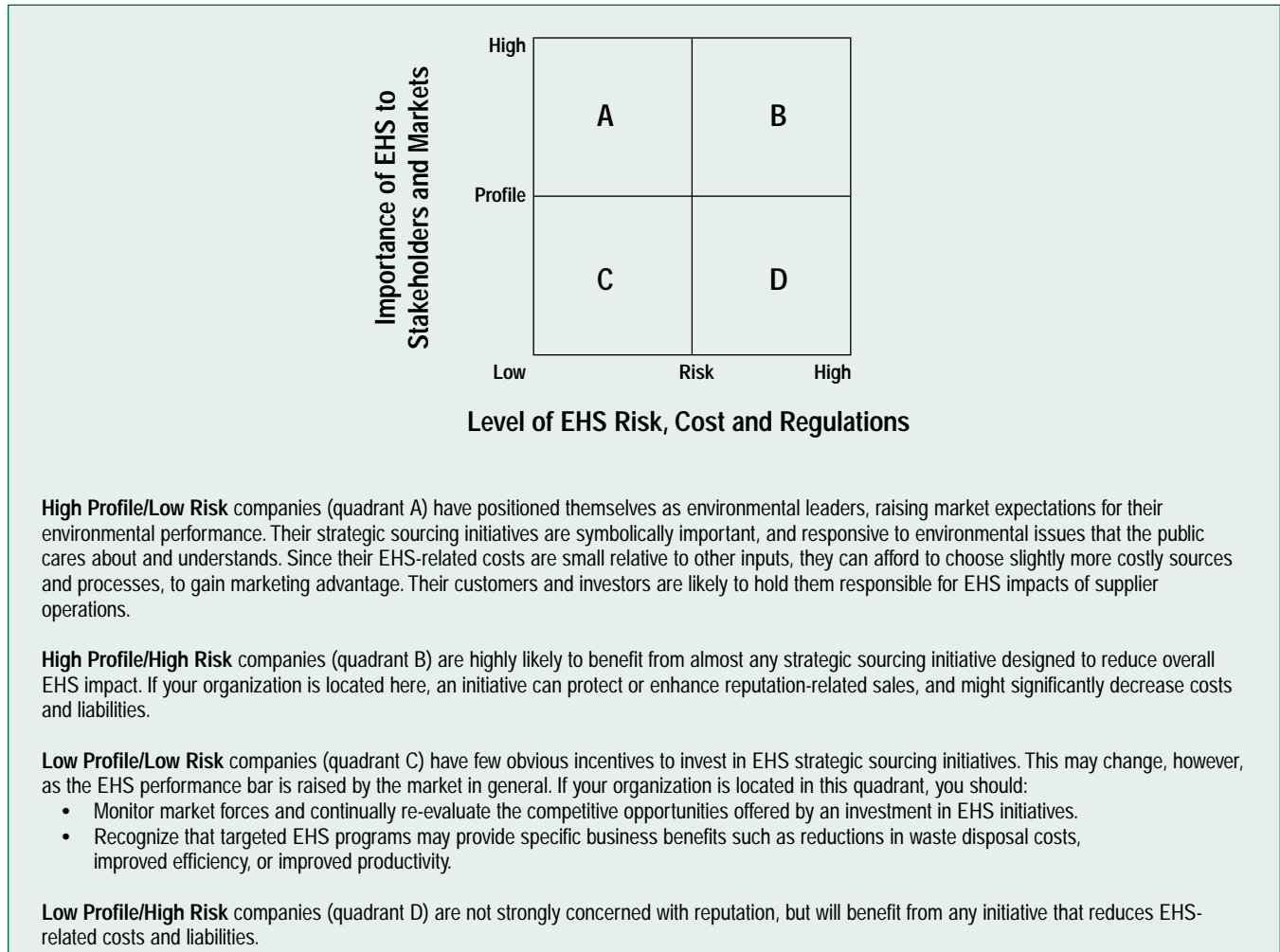
- **LEVEL 3:** Preferred supplier relationships typically last longer than a year, and buyer and supplier collaborate to maximize value.
- **LEVEL 4:** Strategic partnerships involve a mutual investment and sharing of benefits.

Typically, buyers have both more dependence upon their level 3 and level 4 suppliers, and more leverage over them. As a result there are more opportunities to cooperate. These suppliers may or may not expose the company to specific EHS legal liabilities, but any improvements in their financial performance or EHS expertise are likely to benefit the buyer company in the long run.

The importance of managing EHS performance for critical suppliers is illustrated by supplier EHS failures recently reported by GEMI companies as having disrupted their operations directly or indirectly. These failures included:

- A waste disposal problem;
- Spills to the environment;
- A supplier used non-approved material for import to Europe, causing the buying company to miss a market window;
- Supplier asbestos contamination;
- Work at site temporarily halted due to safety issues; and
- Explosion at a toll manufacturing site.<sup>4</sup>

FIGURE 5. IMPORTANCE OF BUSINESS DRIVERS BY INDUSTRY



(4) Examples given by 20 GEMI companies responding to benchmarking survey. Results viewable at [www.gemi.org](http://www.gemi.org), under title of benchmarking surveys.



*How do a company's strategic objectives influence the potential value of better EHS performance in the supply chain?*

Your company's strategic objectives will often determine which types of business value you are pursuing. Table 1 lists competitive advantages that a company might enjoy or attempt to reach.

**TABLE 1. STRATEGIC GOALS AND COMPETITIVE ADVANTAGE**

Possible Advantages	Current Advantage	Strategic Objective	Sample Implications for Strategic Sourcing
Product Innovation			Collaborate closely with key suppliers to accelerate speed to market (supports market share and price).
Price/Costs			Certain EHS performance improvements could cut supplier costs and prices; reliable and efficient supply is required for low cost production. You may also drive up competitors' costs by setting a higher standard and cornering the supplies needed to achieve it.
Brand/Corporate Image			Focusing on EHS impacts that are salient to the public, ensure that all suppliers meet or exceed generally accepted standards of performance.
Product/Service Quality			Work with relevant suppliers to improve quality, develop "greener" products.
Responsiveness/Flexibility			Be sure any strategic sourcing initiative doesn't compromise relations with suppliers.
Financial Strength			Your company can afford to invest in developing supplier capacity.
Compliance/Regulatory Management			Work with relevant suppliers to improve EHS performance of their inputs in your operations.
Litigation/Liability Management			Guard against supplier liabilities you may have to assume; sell your liability management capability to your customers.



### *HOW DO YOU MEASURE EHS RISK?*

“Yes” answers to any of the following questions will indicate a degree of EHS Risk/Impact. The more of the following questions with “yes” answers for your organization, the greater the level of risk.

- Are you in a highly regulated industry?
- Are you subject to reporting regarding toxic releases?
- Are the by-products of your manufacturing process hazardous waste?
- Do you use ozone-depleting substances in your production process?
- Do you have high waste disposal costs?
- Have you had reportable/serious health and safety incidents in the past year?
- Do your employees work in a dangerous environment or with hazardous chemicals?
- Are your employees required to wear protective gear on the job?
- Do you discharge and/or treat large amounts of water during the manufacturing process?
- Have you been found out of compliance by regulatory agencies or subject to government agency fines?
- Are energy costs a high proportion of variable costs per unit of production?
- Do you use lumber or wood-derived products in any of your products/production process?
- Is your manufacturing facility located in a highly populated area?
- Is your organization involved in any litigation relative to EHS?

### *HOW DO YOU MEASURE THE IMPORTANCE OF EHS REPUTATION?*

“Yes” answers to any of the following questions indicates some degree of market exposure and expectation. The more questions with “yes” answers, the higher the corporate profile.

- Is your organization experiencing significant market pressure with regard to EHS?
- Has your organization publicly and explicitly stated its commitment to EHS performance?
- Are you in an industry with strict self-regulation (e.g., the American Chemistry Council Responsible Care Initiative)?
- Do you publish a public EHS report, or have public exposure of your EHS performance through other mechanisms (e.g., government web sites)?
- Have you been found out of compliance by regulatory agencies or subject to government agency fines?
- Have you been the target of criticism or action on the part of advocacy groups or public activists?
- How often is your organization frequently the subject of media attention?
- Is your manufacturing facility located in a highly populated (urban) area?
- Are you required to prepare an emergency plan?

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## CASE STUDY — *HALLIBURTON COMPANY*

### SAFETY MANAGEMENT FOR A SERVICE PROVIDER

Halliburton is a service provider where the service that is provided consists of people - either their own or through subcontractors. Clients hire Halliburton to construct, operate and maintain their oil and gas wells, refineries, petrochemical and manufacturing plants and their logistical activities. In this role Halliburton is asked to take on significant liability for the EHS issues associated with the labor provided and in many cases for client facilities and their operations. In this business, according to Kent Malone, Subcontracts Manager, “our biggest concern is the potential for injury to our employees, our client’s employees and our subcontractor’s employees. Additionally, we are concerned with damage to our client’s assets and damage to the environment.” Halliburton’s commitment to safety is a core value of the organization and is also a means to gain competitive advantage. Because Halliburton has a strong, well-documented reputation for safety and superior performance for their sectors, they are less likely to have to provide extensive documentation to their clients.

Halliburton pre-screens potential subcontractors by comparing their OSHA incident rates to industry-specific ranges published by the Bureau of Labor Statistics. Only contractors with safety records in the top quarter are selected. (This safety screening was implemented without a formal economic value analysis, when the legal department learned of an owner being sued for hiring a contractor with a poor safety record.) Once subcontractors are selected, they are expected to follow Halliburton safety rules detailed in a site-specific safety attachment to their contract/subcontract. Ongoing monitoring is focused on their on-site performance and their company management systems. In an era of tight margins, safety performance can result in savings directly attributed to lower worker’s compensation and insurance costs. Halliburton’s high standards and leading edge safety performance result in an experience modifier rate that is significantly below the industry average. Halliburton typically provides no specific guidance or assessment for environmental performance of its subcontractors, but includes a standard clause in contracts stating that subcontractors will follow all governmental guidelines and regulations.

In the business segment where Halliburton thrives, buyers are looking for subcontractors large enough and robust enough to indemnify them against liability. Halliburton has learned that in contracting with clients or subcontractors, it is wise to have EHS expertise involved from the ground floor, to make sure that liabilities are correctly delineated. It is often necessary to educate clients and negotiate with them concerning EHS responsibilities. An EHS voice is needed on both sides of the negotiating table, to be sure that both parties are protected. ■

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## CASE STUDY — *ANHEUSER-BUSCH COMPANIES, INC.*

### REDUCING PACKAGING WASTE FOR INBOUND MATERIALS

Anheuser-Busch (A-B) has a serious, longstanding commitment to recycling and environmental stewardship, and includes these themes in its marketing efforts.

Proud of their recycling programs, environmental employees at the beer subsidiary noticed one small waste stream that had not yet received attention. The plastic banding used to secure incoming shipments of packaging materials was too heterogeneous to be recycled. Working with suppliers, A-B standardized the banding specification, and as a result now recycles about 800 tons a year of straps, avoiding landfill costs and saving raw materials. A supplier manages on-site storage and recycling.

Breweries have also changed delivery specs for several liquid chemicals, switching from 55-gallon disposable drums to 300-gallon reusable totes that go back to the supplier. This reduces the EHS staff time to manage drums and drum handling-contractors, and also reduces A-B liability for drum management issues.

Both these initiatives resulted in modest financial savings. More importantly, they protected and enhanced A-B's reputation and the commitment of its employees to continuous improvement. ■

## SUMMARY FOR TOPIC ONE

The combined effect of outsourcing and increased corporate responsibility for life cycle EHS impacts means that most procurement departments cannot escape growing responsibility for business value opportunities related to EHS performance. Most departments will be adding EHS criteria to product specifications. Some departments will go further and add EHS criteria to their supplier assessments, at least for risk-laden suppliers (particularly waste disposal and on-site maintenance and construction), and possibly for strategic partners. (Note: Topic Four is focused on ways to assess supplier EHS performance.) The business value that results can flow to the top and bottom line, but will depend in large measure upon the industry and the company's strategic goals.

## TOPIC TWO

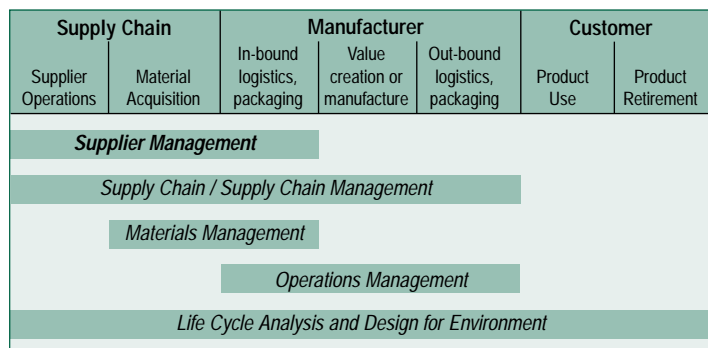
# HOW CAN I FIND UNTAPPED VALUE IN MY SUPPLY CHAIN?

*What EHS issues are important to my company, and how important are they?*

Procurement departments are always looking for new opportunities to cut costs and increase total value. Procurement staff should understand which EHS issues have business implications for their company, and how important they are.

This section describes a systematic process to assess EHS impacts (and their financial consequences) through the entire product life cycle. The life cycle perspective is important because customers, regulators, and courts are increasingly concerned about the environmental impacts before and after manufacturing occurs. Procurement has primary responsibility for the Supplier Management phase of the product life cycle, and a support role during manufacturing and product design.

**FIGURE 6. STEPS IN THE PRODUCT LIFE CYCLE, AND APPROACHES TO MANAGE THEM**



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You should understand several points about the systematic search for value opportunities in the product life cycle that will be described below.

- The value search can be focused on EHS-related business issues alone, or it can have a broader focus on optimizing business performance along the supply chain considering all factors contributing to cost, quality, and risk.
- Ideally this review of the product life cycle involves an interdepartmental team including marketing, design and operations engineers, strategic planning, procurement, and EHS staff. Procurement participation is critical because knowledge of suppliers and well-formulated purchasing specifications can add value through the entire life cycle.
- Absent an interdepartmental effort, procurement staff could work through this life cycle review alone or with EHS support. They could identify the value-adding opportunities within their control, such as improving supplier performance, and identifying input substitutions with less toxicity, easier disassembly, higher recycled content, lower regulatory burden, etc.
- This systematic scanning and prioritizing exercise should be repeated or reviewed every year or two, because EHS regulations, liability concepts, market preferences, competitor positioning, and information are rapidly evolving. Emerging EHS issues are likely to include packaging reductions, greater recovery and reuse of products, energy efficiency, greenhouse gas emissions, water shortages, habitat destruction, endocrine disruption, and ergonomics.

### *A four-step search for value opportunities related to EHS performance*

The systematic search for value opportunities in the product life cycle has four possible steps. As a procurement professional you will want to complete at least steps one and two to better understand the potential value impacts of new EHS criteria in purchasing. Steps three and four would lead to a company-wide interdepartmental program to enhance business performance. The four steps can be described as answering four questions.

- What are the significant environment, health and safety impacts of the product or service?
- Which have significant impacts on business value?
- What are our significant business risks and value opportunities at this time?
- What are our top priority initiatives to gain or protect business value?

*Step one* in this planning process is to identify EHS impacts along the product life cycle of a particular product line. EHS-related business risks and opportunities can be assessed at each point in the product life cycle, for many different types of impacts. Use Table 2 or a similar tool to map all EHS impacts. Highlight the cells in this table that indicate significant impacts on health and the physical and biological environment. The row titles at the left side provide a fairly complete checklist of possible EHS impacts. Review and possibly revise these row titles consulting with your company's EHS department to assess coverage, relevance, and priority for your industry.

**Step two** in the process is to identify which of these impacts have business consequences. This is a function of the social, regulatory, and economic environment. Screen out the EHS impacts and issues that don't yet have financial implications, and assign a business value goal or ranking to the remaining impacts. There are three likely business value goals/rankings: 1) to meet current legal requirements and prevailing standards; 2) to exceed these standards by a comfortable margin (meeting voluntarily selected standards); and 3) to optimize performance.

Some business value goals/rankings will be common to all companies in your industry, but some may be specific to your company's strategic goals, processes, locations, or suppliers. Ranking will reflect the relative importance of different drivers of

business value for your company (reducing costs, minimizing liabilities and risk, enhancing or protecting reputation or sales). Do you compete on cost or quality? Is your strategic goal for EHS performance to avoid risk, not fall behind competitors, stay comfortably ahead of competitors, or be the leader in EHS performance?

**Step three** is to identify value-adding opportunities to improve EHS performance. For starters, examine impacts that are costly to manage, cause regulatory violations or are important to customers and regulators. Note any impacts where current performance is below the business goals you set in step two. Note any areas where your business goal is to optimize value and minimize risk. Typically, 80% of the potential business value lies in 20% of the impacts being considered.

TABLE 2. SCANNING MATRIX FOR EHS IMPACTS, RISKS, AND VALUE OPPORTUNITIES

Possible EHS Impacts	Phase of Life Cycle:								
	Drivers for Concern		Supply Chain		Manufacturer			Customer	
	Cost/ Risk	Reputation	Supplier process	Material acquisition	In-bound logistics, packaging	Value creation or manufacture	Out-bound logistics, packaging	Product use	Product retirement
Natural Resource Use									
Energy consumption									
Depletion of water resources									
Unsustainable resource use									
Environmental Impacts									
Degradation of ecosystems									
Extinction of species									
Bio-accumulative pollutants									
Ozone depleting releases									
Global warming gasses									
Other chemicals released to air									
Water pollution (surface, ground)									
Indoor air pollution									
Hazardous solid waste									
Other solid waste									
Safety risks									
Chemical									
Mechanical									
Electrical									
Fire and explosion									
Health Impacts									
Acute toxicity									
Carcinogenicity									
Developmental/reproductive toxicity									
Irritancy, sensitization									
Ergonomics									
Noise									
Radiation									
Endocrine disruption									
Possible Coding Scheme:	blank - Not relevant highlight - Relevant	? - Impacts need more study ○ - Clear risk or opportunity	x - Current response adequate (+) - Competitive advantage						

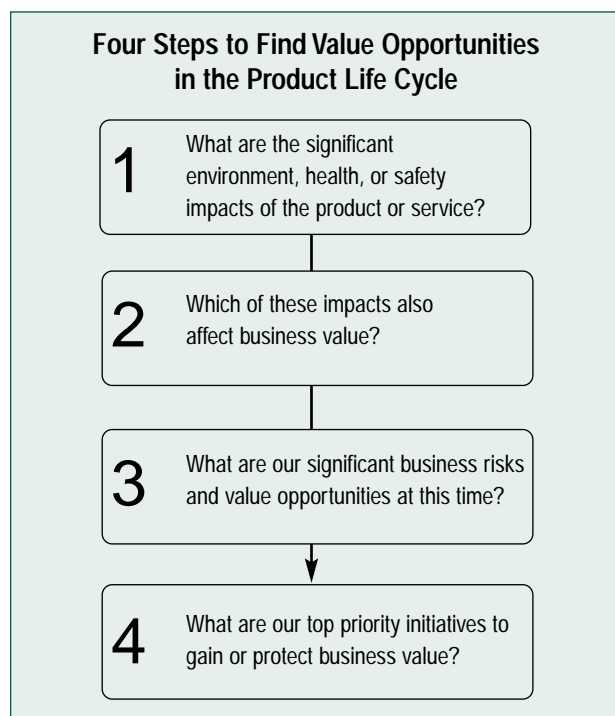
**Step four** is to set top priorities. Estimate and compare the business value of current practice and likely alternatives, taking into account the six different ways EHS performance can impact profitability<sup>5</sup> (discussed in Topic One):

- Direct costs are easily or typically allocated to a product or process;
- Hidden or indirect costs are buried in other budgets (e.g., permitting, notification, reporting, inspections, disposal, training, workers compensation, insurance, medical costs, lost time, protective clothing). These hidden costs are often a major source of savings from improved EHS performance. They can be estimated through diligent EHS or full cost accounting;
- Contingent costs depend upon the odds of a future event occurring (e.g., a spill, violation, lawsuit);
- Image/Relationship costs or benefits are related to the perceptions of customers and other stakeholders;
- Superior products can increase market share, prices asked, and revenue from sales; and
- Superior EHS performance can facilitate marketing and promotional activity.

Most of these costs are difficult to calculate with precision. Therefore a preliminary rough estimate should be assigned to each opportunity, and only then should a more detailed calculation be considered for the most promising options. The relative importance of business drivers will determine how much precision is sought in these estimates and how much weight is allocated to different types of costs. When liability or reputation dwarf cost as a business driver, many procurement decisions can be made without detailed calculations. For example, Intel recently decided to join many other companies in agreeing to buy only wood products certified to come from well-managed second-growth forests. Intel buys few wood products, so the cost consequences were small. To protect reputation, a decision was quickly made without a detailed calculation of pencil prices.

Many companies launching major initiatives to assess or improve supplier management of EHS issues have done so based on a judgment of business value, instead of a careful calculation. When cost is the major driver, then a more detailed calculation may be needed to set priorities.

You are well versed in making value decisions that include both quantitative and qualitative criteria. To select suppliers, you typically assign weights to different criteria. As you become aware of business-relevant EHS impacts, you can easily assign a weight to these new dimensions of product and supplier performance.



(5) For a more detailed description of EHS-related costs and calculation methods see *The Lean and Green Supply Chain: A Practical Tool for Materials Managers and Supply Chain Managers to Reduce Costs and Improve Environmental Performance*, published and distributed free by the EPA's Environmental Accounting Project at [www.epa.gov/opptintr/acctg](http://www.epa.gov/opptintr/acctg).



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## CASE STUDY — 3M

### LIFE CYCLE ASSESSMENT TO IMPROVE PRODUCT FEATURES

3M is implementing a life-cycle approach to identify potential EHS improvements with business value in all stages of a product's life cycle, from material acquisition and manufacturing through customer use and disposal. 3M launched a formal Life Cycle Management System for its products in 1997. By end of the year 2000, virtually all of the company's business units are expected to be using formal life cycle assessments in their new product decisions. (3M employees bring about 500 new products to market a year; nearly one-third of 3M total revenue comes from products introduced in the last four years.)

The life cycle focus is a logical extension of 3M's Pollution Prevention Pays (3P) Program. Over 25 years 3P reduced 3M's hazardous wastes by more than 800,000 tons with first-year savings exceeding \$825 million. Much of these savings were achieved by reducing use of organic solvents, a research-intensive strategy that led to new low-emissions technologies, materials with unique properties, competitive advantages and a host of new products. With Life Cycle Management, 3M continues its 3P effort and extends its focus to include customer environmental performance issues. 3M's Life Cycle Analysis is a qualitative one, designed not to score or rank products but to identify risks and opportunities particularly during the use and disposal phase of product life. Recent achievements guided by the Life Cycle Management System include the following examples.

The Commercial Graphics Division has developed a new film that customers can cut electronically or with dies to make letters and designs for signage. Manufacturing the film now requires 80% less solvent, addressing a number of EHS issues. By eliminating an in-process liner layer, the amount of manufacturing waste is decreased. Trim waste is also recycled as a raw material back into the process.

The European Union's Waste of Electrical and Electronic Equipment Directive will require that industry take back all electronic goods and recycle used equipment. Appliance manufacturers found it difficult to recycle product cases because product labels were incompatible with the thermoplastic resins used in product housings. These labels had to be peeled, cut, or ground off before the resin could be recycled into high-value products. Working with plastics suppliers and a European-based global manufacturer, 3M Europe formed a team which spent more than two years testing materials never before used to make labels. The result is a new Recycling Compatible Label product that reduces customers' costs for raw materials, labor, and disposal. Compatible labels make plastic recycling easier and more profitable, which should lead to potential applications in the automotive industry as well.

3M's Surface Saver™ Tape has been used by the optical industry for 20 years to process ophthalmic lenses into prescription eye wear. Erosion in market share prompted 3M to develop an improved tape. The team evaluated the product life cycle of Surface Saver tape, from inventory of materials and processing, to waste reduction issues at customers' locations. The new tape is manufactured in a more efficient process, without solvents. The redesigned tape needs no liner layer. This reduces customer cost for shipping and waste disposal, and improves efficiency through less frequent roll changes. The innovations virtually eliminated solvent use, cut solid waste by 40% for 3M and its customers, increased market share, and stabilized rising manufacturing costs.

At 3M, the Life Cycle Management process is supported by 3M's Corporate Product Responsibility staff, which helps business units commercialize safer and more environmentally responsible products. Each business unit appoints a Product Responsibility Liaison to help product teams apply LCM. 3M technology research centers develop better processes and products, and share results electronically and in meetings and events with the 3M technical community. In addition, Life Cycle Management success stories are circulated throughout the company on attractive one-page brochures. These emphasize that the value 3M delivers to its customers by improving the EHS performance of its products over their entire life cycle. ■

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## CASE STUDY — *EASTMAN KODAK COMPANY*

### OBTAINING SUPPLIER INFORMATION TO TEST AN ECO-EFFICIENCY INDICATOR

When there are many different types of life-cycle impacts to assess, how can a company select one material as clearly superior to another? Eastman Kodak Company struggled with this question as it designed digital cameras. Several different weighted scoring systems have been proposed to calculate the eco-efficiency of a material or component. Kodak decided to test these scoring systems at the same time as it researched the HSE impacts of digital imaging. To calculate Product Eco-Efficiency Indices, Kodak needed quantitative information concerning environmental impacts of components and materials in the supply chain.

Many key components were sourced from suppliers. Initially, Kodak HSE representatives contacted their fellow HSE representatives at supplier companies to explain the objectives of the Product Eco-efficiency Project and recruit participation. Although the suppliers' HSE representatives understood the relevance of the project and the importance of the suppliers' component information, they often did not have the information, nor were they in a position to approve its release to Kodak. Significant time was lost identifying appropriate decision makers within the supplier companies. Once the decision makers were identified, they often had concerns sharing information which they viewed as confidential or proprietary.

Learning from the failure of this initial effort, Kodak developed a better information collection process. It strives to reduce turn around time for supplier component information and ensure confidentiality while also providing an incentive for suppliers to participate. Kodak HSE representatives now work through the Kodak Procurement or Commodity Managers. These Managers are asked to send a letter requesting participation to their contacts at the supplier companies. The letter specifically states the strategic importance of the Product Eco-Efficiency Project to Kodak and that the suppliers' participation will indicate their interest in working in partnership with Kodak.

To ensure confidentiality, Kodak has contracted the services of Ecobalance, Inc., an expert in environmental life cycle analysis to assist with the product eco-efficiency project. Ecobalance collects component information from the supplier and performs the necessary analysis. They then provide Kodak only with the aggregated information addressing environmental impacts, eliminating the need to share specific raw material formulas or process parameters. In addition, each supplier company has the opportunity to review the results of the analysis before they are disclosed to Kodak.

As an incentive Kodak also agrees to provide the results of the Ecobalance analysis to the suppliers for their use. This give suppliers new insights into the environmental profiles of their products. It is also useful for public communications, responding to requests from other customers, and for environmental labels such as those described in the international standard ISO 14020.

Based on analysis of the digital camera data, Kodak's Design for Health, Safety, and Environment Group has selected the Eco-Indicator 95 Index for its continuing experimentation with life cycle assessment. They are currently assessing which types of decisions might be assisted by using the Indicator, and expect to test the Eco-Indicator 99 Index when they have assembled more life cycle impact data. ■

### How do I measure the costs and benefits of an EHS improvement?

Table 3 illustrates some approaches to measure costs and benefits of EHS improvements in a procured material. Remember that costs hidden in other budgets are a major source of EHS related savings. The benefits are ordered from hardest to softest; most would persist into future years.

Strategic advantage, reputation and public good will are often labeled "soft benefits" because it is difficult to estimate their financial value precisely. Companies and departments differ in terms of how

much "soft benefits" are allowed into a calculation of the value of a given investment. At one end of the spectrum are those organizations that only consider the hardest of quantifiable benefits when evaluating programs. The risk of this approach is that the company will miss opportunities to make strategic, quantum leap improvements in their operations because these improvements cannot be fully justified using only hard numbers. At this end of the spectrum, money is often left on the table by disregarding intangible benefits that may have added significant, yet difficult to quantify value to a discarded program.

TABLE 3. FIRST YEAR BENEFITS OF A SAMPLE SOURCING INITIATIVE

Type of Benefit	How to Calculate it	Example
Reduced raw materials waste	Materials saved per unit x Units of production	\$.25 less materials purchased per unit x Planned volume per year of 1,000,000 units = \$250,000
Reduced transportation costs	Reduction in number of shipments or in shipping cost per load if capacity of truck maximized	6 fewer trailer loads received per year x Average cost per load of \$3,000 = \$18,000
Reduced waste disposal costs	Disposal costs per unit of product x Planned volume of production	\$.20 savings per unit of product x 1,000,000 units = \$200,000
Reduced compliance costs	Lowered consulting and legal expenses related to violations or new permits	Avoided cost of new permit = \$100,000 if non-hazardous materials are used
Reduced cost of incidents	Average number of incidents per year x Average cost per incident for cleanup and employee health/absence/overtime	2 reduced incidents per year x \$7,800 average cost incident = \$15,600
Reduced risk of business interruption due to regulatory violation, boycott, supplier interruption, spill, toxic release, etc.	Likelihood of risk x Reduction of likelihood of risk x Estimated cost of risk	2% likelihood x 50% reduction in chance of plant shutdown for a week due to supplier interruption x \$6,000,000 lost fixed cost and revenue = \$60,000 cost reduction
Customer retention rate increases	Percentage increase in repeat sales x Profit per unit sale	5,000 units sold beyond plan because of increase in customer retention x \$100 profit per unit = \$50,000
Increased market share as a result of enhanced reputation attracting new customers	Number of new customers per year x Sales per customer per year x Profit per unit sale	20,000 new customers per year x 2 units sold per customer per year x \$100 profit per unit = \$4,000,000

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At the other end of the “benefit” spectrum are those organizations that allow strategic considerations to weigh heavily in their investment decisions. Because the value of “soft” benefits is more difficult to accurately assess, the risk here is that the company will find itself burdened with a relatively high number of unproductive and

ineffective programs that were justified largely based on fuzzy estimates of soft benefits. This is particularly a problem when no good mechanism exists for evaluating and stopping initiatives that are not realizing an adequate “return on investment (ROI).”



TIP

### ESTIMATING THE VALUE OF LESS TANGIBLE BENEFITS

Companies who ignore the less tangible benefits of EHS performance miss opportunities to create competitive advantage. The key to estimating the value of soft benefits is to recognize that their impact on business value will be realized either as top line (increased sales and revenues) or bottom line (decreased cost) benefits. For example, one of the soft benefits that may be derived from a strategic sourcing initiative is a more positive relationship with regulators. Ultimately, this could translate into a reduction in the time and labor costs associated with managing regulatory relationships, as well as increased flexibility and quicker time to market. Taken to the extreme, it can result in greater influence over the regulatory process and the ability to participate more effectively in designing regulatory approaches. Once the thread of impact has been traced to the top or bottom line, then both the likelihood that the identified benefit will occur as a result of the program in question, and its actual dollar value must be estimated. Often, acceptable estimates of both the value and likelihood of a soft benefit can be arrived at based simply on experience and reasonable expectations. Other more stringent methodologies for estimating “soft” value include:

- **Proxy data:** Find examples of actual events similar to that being analyzed and use real data from that event to estimate the impacts of the proposed scenario.
- **Survey data:** A survey asking managers how much they would be willing to pay for certain outcomes (e.g., a reduced risk of environmental incidents) will produce an estimate of their value. Surveys can also be used to identify the impact of proposed initiatives on customer buying behavior.

For a more detailed description of prevailing financial tools used to assess business value, consult the electronic appendix files that include a table of financial tools, along with a detailed step-by-step example.<sup>6</sup>

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(6) See also, *Environment: Value to Business*, also published by GEMI at [www.gemi.org](http://www.gemi.org)

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## CASE STUDY — *ANHEUSER-BUSCH COMPANIES, INC.*

### REDUCING IMPACTS OF THE PRODUCT LIFE CYCLE

Anheuser-Busch (A-B) is the world's largest brewer; 60 percent of its beverages are sold in aluminum cans. Aluminum cans gained favor over steel cans in the 1960s. They better maintained the taste of canned beer and allowed beverages to cool more quickly. In the 1970s, growing concerns about solid waste, litter, and energy consumption prompted A-B to minimize the environmental impacts of aluminum cans. One initiative reduced the weight of individual cans, another developed recycling capacity.

Technical experts from packaging technology, the EHS department, the beer subsidiary, and the aluminum can subsidiary of A-B collaborated to develop the lighter can. They involved other aluminum can suppliers, including American National Can, Reynolds, Ball Metal, and Crown Cork & Seal. Most of the weight reduction came from decreasing the thickness of the can walls. The diameter of the can lid also decreased, from 2.56 inches in the 1970s to 2.25 inches in 1992. A-B developed the smaller lid specifications for the entire beverage industry, shared the specification with all suppliers and led all other brewers in adopting it. This initiative reduced the average weight of aluminum cans by 30 percent – from 45 pounds per thousand in 1974 to 30 pounds per thousand in 1998.

Weight reduction significantly reduced life cycle costs. An up-front reduction in the weight of the can impacts costs of natural resource extraction (of bauxite), transportation (of bauxite to aluminum can manufacturers), production (of aluminum from bauxite), transportation (to brewers and other beverage companies), use, and recycling. Merely converting to the smaller lid saves enough energy each year to supply the residential power needs of a city the size of St. Louis for more than 5 weeks.

Anheuser-Busch has also trimmed life cycle impacts with an aggressive commitment to recycling. Phasing out cost-competitive bimetallic cans in 1979 eliminated the need for magnetic separation and improved efficiency of can recycling. Using stay-on “ecology” tabs helped ensure the complete package is recycled. In 1978 A-B founded the Anheuser-Busch Recycling Corporation (ABRC), and worked with wholesalers and community-based recyclers to create an effective loop from beverage consumers to can makers to beverage producers. ABRC purchases baled flattened cans and offers recyclers technical assistance and lease programs to optimize their equipment. ABRC arranges for shipment of prepared cans from more than 1,000 suppliers in North America to can reclamation facilities that convert the used cans to ingot. This ingot is then rolled into fresh can sheet stock for the company's can suppliers. More than 50% of an average can and lid is recycled aluminum.

A-B remains the only U.S. beverage company that operates its own recycling subsidiary. ABRC recycles more than five cans for every four that the company's breweries fill with beer, and has now recycled more than 8 billion pounds of aluminum. Since 1978, the recycling rate for aluminum cans has climbed from 27% to 63% – a rate greater than for any other type of consumer package. ■

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## CASE STUDY — *ASHLAND, INC.*

### LIFE CYCLE MANAGEMENT AS BUSINESS OPPORTUNITY

For Ashland's Specialty Chemical and Distribution businesses, their customers' need to manage life cycle impacts of chemicals is a business opportunity. Ashland collaborates with its customers to improve business performance at many points in the supply chain, from R&D through manufacturing, distribution, and waste disposal.

Within research and development, efforts have included reformulating products that will be used in the production of consumer products to eliminate the use of VOCs and the regulatory burden imposed by the Clean Air Act.

Technology development in the manufacturing of foundry resins has allowed customers like BMW and General Motors to substitute aluminum for traditional steel in the manufacturing of vehicle engines and transmissions. This in turn has improved vehicle fuel efficiency and recycling at the end of product use.

Ashland's Total Chemical Management Services electronic chemicals businesses have developed product handling techniques that have improved customers' use of certain products (e.g., isopropyl alcohol, through recycling and methods of application that improve production efficiency, reducing product and waste management costs). Often Ashland employees are placed on customer sites to manage chemical deployment from purchase through production to disposal.

The Environmental Services Business provides site-specific waste management solutions that reduce the burden of waste management by the customer. Upon transfer of waste, Ashland indemnifies customers against legal liability.

By managing their chemicals and associated liabilities, Ashland helps its customers focus on their primary areas of business. ■

## SUMMARY FOR TOPIC TWO

By systematically scanning the entire product or service life cycle, you can identify important EHS impacts, possible improvements, and related business opportunities. These may occur before purchase, during your business operations, or in customers' hands. To set priorities, quantify business value for the most promising improvements.

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## TOPIC THREE

# HOW CAN PROCUREMENT ADD BUSINESS VALUE?

### *What different roles can procurement play?*

You as a procurement professional have primary responsibility for the Supplier Management phase of the product life cycle, where business value can result from the careful inclusion of environment, health, and safety (EHS) criteria in product and supplier selection. You also play a key support role in the rest of the product life cycle by informing colleagues of new supply/value options, and facilitating supplier participation in collaborative planning.

Topic two started with the same Figure 6, and described a scan of the entire product life cycle to identify business value opportunities from potential improvements in EHS performance. As an advance scout for business value, you should be aware of the variety of value possibilities all along the life cycle.

This third topic covers what procurement can do, once a value opportunity is identified. Procurement has a role to play wherever these opportunities are found in the product life cycle, but the phase of the life cycle will determine how your department can add value.

**FIGURE 6. STEPS IN THE PRODUCT LIFE CYCLE, AND APPROACHES TO MANAGE THEM**

Supply Chain		Manufacturer			Customer	
Supplier Operations	Material Acquisition	In-bound logistics, packaging	Value creation or manufacture	Out-bound logistics, packaging	Product Use	Product Retirement
<i>Supplier Management</i>						
<i>Supply Chain / Supply Chain Management</i>						
<i>Materials Management</i>						
<i>Operations Management</i>						
<i>Life Cycle Analysis and Design for Environment</i>						

As shown in the table below, proactive procurement departments may add value by participating in the evolution of design decisions and in the development of specifications, identifying superior alternative inputs, bringing knowledgeable suppliers into the planning process, and coordinating requirements of different departments. Such integrated proactive procurement focused on whole-chain financial optimization typically results in 10%-20% cost savings and a substantially greater increase in profits.<sup>7</sup> Procurement should therefore seek an active role in initiatives such as Six Sigma and DfE (Design for Environment) that strive for whole-system optimization and recognize the critical importance of the design phase in reducing costs and environmental impacts. A growing number of

manufacturers are using Six Sigma to rigorously analyze the entire production process and optimize it to achieve clearly identified customer priorities. As EHS impacts become more important to customers, it is likely that they will be included in these analyses.

While procurement integration at the design stage is a major source of potential business value, this document is focused on supplier management, where procurement plays the lead role in securing business value. This role is critical. For a typical manufacturer, purchased inputs typically account for 60% of all product costs and 50% of the quality problems that arise in operations. Effective collaboration with suppliers can cut time to market by 25%.<sup>8</sup>

TABLE 4. PROCUREMENT ROLES AND VALUE OPPORTUNITIES

	Value Opportunity in Product Life Cycle	Procurement Role
1	Redesign of company's product or service	Describe available supply options, facilitate collaboration with expert suppliers, and help craft accurate purchasing specifications.
2	Redesign for process improvement	Describe available supply options and facilitate collaboration with expert suppliers, and help craft accurate purchasing specifications.
3	Decision to subcontract process	Conduct a make or buy analysis.
4	Streamline materials management (integrated procurement or inventory minimization)	Facilitate collaboration with other departments and suppliers to optimize whole-system supply chain performance.
5	Obtain better products and services	Identify and propose superior alternatives. Select new suppliers and/or work with current suppliers to improve supplier quality and process. Perform quality assurance checks.
6	Improve in-coming transportation and logistics	Assess total costs of logistics system and develop appropriate control mechanisms.
7	Improve supplier processes	Monitor process, provide education and suggestions, and facilitate expert-to-expert collaboration.
8	Improve supplier organizational strengths (financial soundness, reliability)	Evaluate supplier management systems, screen out weak organizations, and help suppliers improve management systems.

(7) David Burt, Richard Pinkerton, *A Purchasing Manager's Tool to Strategic Proactive Procurement*, American Management Association, New York, 1996, pgs. 8-10.

(8) *Ibid.*, xi.



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## *What are the value options in supplier management?*

Supplier management addresses the value opportunities shown on rows 5 to 8 of Table 4. You probably assess and manage four aspects of suppliers: purchased products and services, transportation, supplier processes, and supplier organizational characteristics. EHS criteria can be smoothly integrated into all four, with potential impacts on business value as shown in Table 5. The company's strategic goals and the strength of business drivers (regulation vs. customer preferences) will determine the relative importance of top and bottom line value impacts. Table 5 is a springboard for noting some value impacts that are uniquely or importantly associated with EHS procurement.

*EHS-related features of purchased products and services* are major contributors to the hazards and liabilities encountered in your company's operations. Hazardous inputs lead to very high indirect costs such as training, personal protection, record keeping, insurance premiums, workers compensation, and waste disposal. Typically the costs of managing hazardous materials far exceed their purchase cost. The relatively few companies that have analyzed these costs were surprised by their results. If you must estimate these costs, err on the high side. Hazardous materials also increase the odds of non-routine contingent costs being incurred for fines, crisis management, and lawsuits. On the other hand, superior EHS-related product features can be selling points. Examples include absence of toxins, reduced health exposures, recycled content, ease of recycling, and energy efficiency. For many companies, superior input specifications are procurement's greatest potential contribution to EHS-related business value. You can seek ingredients and components that contain fewer toxic chemicals, generate less

packaging waste, are safer to process, and are easier to re-use, disassemble, or re-claim. For example, Eastman Kodak pre-screens candidate chemicals using EPA's P2 software, to quickly eliminate highly toxic chemicals from consideration early in the design process. There are a number of ways to improve EHS performance of inputs. Some companies add EHS impact information to their product catalog. Others create lists of pre-approved products and/or banned products. Kodak, Volvo, Ford and Toyota have all established lists of chemicals they prohibit. A time saver for procurement is the growing number of products that are labeled or certified by government and/or third party organizations as energy efficient Energy Star® or environmentally preferable green label, (i.e., superior to average products in every impact category considered). Many of these certifications reflect the "environmental burden" generated by the product before it reaches the buying company.

*Input "pedigree"* refers to historical characteristics of product origin, which are separate from the qualities of the product itself. Examples are carbon emitted to produce electricity, old-growth forests cut down to produce lumber, dolphins killed to catch tuna, chemicals on site or released during supplier manufacturing. Even though these characteristics arise in the supplier's process, they become "attached" to the product. Because "pedigree" characteristics are not part of the input itself, they do not affect the manufacturer's direct and indirect costs. Their impact on value is entirely at the sales end of the supply chain, where it can be significant. Pedigree issues are increasingly important to both households and business customers. Volvo asks suppliers to remove blacklisted chemicals not only from the components it buys, but also from their entire facility.



### *PRODUCTS ARE TYPICALLY JUDGED "GREEN" OR RESPONSIBLE IF:*

- Their material ingredients were created without degrading environments or depleting world resources;
- The process of manufacture did no harm to workers or the environment;
- The product (and any by-products) are ultimately reabsorbed and recycled in the biosphere (this may entail biodegradability, and/or ease of disassembly and recycling).

**Transportation arrangements** can sometimes be adjusted to improve business value by taking into account the EHS impacts of transportation mode and frequency of delivery. For example, a value assessment could take into account carbon emissions from trucks vs. trains, the paperwork costs of receiving hazardous shipments, and the cost of disposing of obsolete or unused materials. This could alter the calculated economic order quantity.

**Supplier process** can be extremely important as the source of “pedigree” features described above. Also, whenever a buyer company ends up legally liable for a supplier’s negligence or past practices, the issue is almost certain to involve environment, health or safety impacts. Newsworthy cases of egregious supplier EHS negligence can also impact the buying company’s reputation, if the two companies are closely linked in the public’s mind. Quality initiatives have already focused procurement attention on supplier process. Additional EHS issues to monitor include the supplier’s use of non-renewable resources, their energy and water use, local environmental impacts, toxics released, workers exposed to dangerous chemicals, and safety records for employees and contractors.

TABLE 5. PROCUREMENT-MANAGED EHS IMPACTS ON BUSINESS VALUE

Procurement Variable “X” shows a potential impact on business value	Types of Business Value					
	Impacts on Costs			Impacts on Revenue		
	Direct Costs of Operations	Hidden and Indirect Costs	Contingent Costs (Risks, Liability)	Image and Relationship Costs and Benefits	Superior Product Benefits	Marketing Benefits
<b>Purchases Input (product or service)</b>						
Cost of Input	X					
EHS-related features		X	X	X	X	X
Other features		X		X	X	X
Consistency/Quality	X	X	X	X	X	X
Input “Pedigree”/origins				X	X	X
<b>Transportation/Delivery</b>						
On-time delivery	X	X		X		X
Transportation mode	X	X				
<b>Supplier Process</b>						
EHS impacts			X	X	X	X
Other qualities				X	X	X
<b>Supplier Organization</b>						
Financial strength			X			
Reliability of supply	X	X	X	X		X
Supplier expertise	X	X	X	X	X	X
Supplier commitment	X	X	X	X	X	X

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## CASE STUDY — *ELI LILLY AND COMPANY*

### FINE-TUNING PURCHASING SPECIFICATIONS TO REDUCE WASTE TREATMENT COSTS

At one Eli Lilly and Company facility, a waste tank was being cleaned during a routine maintenance shutdown. In preparation for disposal, the sludge from the tank was tested for a variety of parameters and showed significant levels of lead, enough that continued accumulation at this rate would eventually trigger hazardous waste requirements and further multiply management and disposal costs. Cleaning lead from equipment and disposing of lead-contaminated waste is very costly. The source of lead was unclear; no process at the facility required lead, and no product shipped had any lead content. After several weeks of consultation with process engineers and suppliers, the source was identified as a contaminant in a zinc raw material.

Zinc was being used as a catalyst in a bulk manufacturing step. Lead is a natural contaminant in zinc. The company's specification for lead concentration in the purchased raw material was relatively high since its presence did not affect the product quality, and was not carried through to subsequent processing steps. Nor did the lead affect production. The zinc (and lead that came along with it) used in the process was not consumed but ended up in the waste stream where the otherwise harmless lead was having unforeseen consequences on waste management practices and disposal costs. It turned out the same supplier was also selling a low-lead zinc to some of its other customers.

Procurement staff determined that buying zinc with lower levels of lead would add 3% to the purchase price, increasing total purchase cost about \$7,500 per year. This would decrease exposure to lead and eliminate the need to remove lead sludge from equipment which costs over \$30,000 per event. Lilly modified its zinc specification to set a lower lead concentration limit. While low-lead zinc carried a slightly higher price, the increased costs were easily offset by a reduction in waste management concerns and disposal costs. ■

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## CASE STUDY — *BRISTOL-MYERS SQUIBB COMPANY*

### EHS WORKSHOPS FOR PROCUREMENT STAFF

Like consumers, businesses can purchase apparent bargains based on price alone, discover performance problems later, then wish they had bought a more expensive alternative that delivered better total value. Bristol-Myers Squibb found that many price-focused purchasing decisions ultimately harmed the bottom line, due to quality or environmental problems such as increased reject and scrap rates, reduced production efficiencies, and higher waste disposal costs.

To enhance the total business value of purchasing decisions, Bristol-Myers Squibb corporate EHS staff conduct quarterly “Cost Not Price” workshops for the company’s buyers and purchasing managers from different divisions and facilities. These four-hour workshops help participants identify EHS and quality-related costs. Several case studies are explored, each including dollars saved or wasted by a real purchasing decision. A checklist of possible EHS/Quality issues (tailored to each business) is distributed and discussed.

Upon completion of the workshop, participants had a better understanding of:

- Impacts purchasing decisions have on product quality and the environment;
- Quality and environmental drivers, goals, and management systems;
- Approaches for analyzing full cost vs. price; and
- Strategies for making sustainable, low-cost purchasing decisions (including early consultation with EHS professionals).

Staff report the workshops have strengthened the working relationship between the EHS department and the Global Strategic Sourcing Group. ■

Supplier organizational strengths maintain and improve the quality of supplier process. Procurement already evaluates critical suppliers to ensure that they are efficient, reliable, and committed to quality. Financial strength, strong leadership, clear priorities, thorough training, and mechanisms for continuous improvement are also critical to EHS performance. Specific EHS-related aspects include the supplier's EHS management system policies, routines and certification, and special expertise and research efforts related to EHS impacts.

### *How can EHS criteria be implemented?*

For each EHS impact deemed to have business value, you will want to consider which types of value it offers, then determine one or more business goals.

When the business goal is reduction of legal liability, procurement must be very certain that critical products, services, and suppliers meet or exceed specific legal standards.

When the business goal is protecting reputation, a larger number of EHS-relevant products, services, and suppliers should perform adequately enough to not attract attention, and possibly excel in one or two aspects of particular interest to the public. The corporation may also mandate quotas (purchase

25% of electricity from renewable sources) or premiums (be willing to pay up to 5% more for products or services with clearly superior EHS performance). These procurement mandates can be used in public relations and positioning and can enhance the brand image of the company.

When the business goal is reduced operating costs and increased sales revenue, procurement should screen out clearly inferior products, services, and suppliers, and weight the selection process in favor of features that lower total operations cost and please customers.

These goals may directly translate into the minimum requirements, ranking criteria, performance targets, and/or contract incentives. The way procurement formulates and pursues these goals may vary based on the closeness of the supplier relationship.

**TABLE 6. FOUR LEVELS OF SUPPLIERS**

<p><b>Level 1:</b> <b>Spot Purchasing</b></p>	<p>There is little or no relationship with or knowledge of the supplier. Price is the key determinant of purchase. To the extent that quality is important, it is assessed based on predictable product characteristics or supplier reputation alone. Each transaction is its own business contract. Commodity items such as coal, sand, mops, and pencils are often purchased on the spot market. To control EHS impacts, change products or product specs. For example, Intel prohibits the purchase of pencils and other wood products made from old growth forest resources.</p>
<p><b>Level 2:</b> <b>Competitively Based Incumbent Relationships (CBIR)</b></p>	<p>Suppliers have a long-term business relationship, typically an annual contract against which purchase orders are issued. Contracts are renewed annually. Your business is theirs to lose. Relatively little technical cooperation is invested in these short-term relationships, because a better supplier may be located the next year. To control EHS impacts, change specs for the annual bid, and let the world know you are always looking for suppliers who can better meet these specs.</p>
<p><b>Level 3:</b> <b>Preferred Supplier</b></p>	<p>The intention is for a long-term relationship, that requires and benefits from fairly frequent communication and collaboration to improve or adjust supplier inputs over time. To control EHS impacts, include EHS issues in the periodic visits and meetings where progress and quality are discussed, and targets may be set.</p>
<p><b>Level 4:</b> <b>Strategic Partnerships or Alliances</b></p>	<p>Relationships involve an even deeper level of commitment. Typically, there is an explicit or implicit understanding that supplier and buyer will share the business benefits of effective collaboration. To influence EHS impacts, add EHS to the agenda of problems the partnership must address. Write contracts so that the business value of better EHS performance is shared among the partners.</p>

### Which suppliers are important?

You typically classify your suppliers at one of four levels based on the intimacy and mutual dependence of the relationship:

- Level 1: Spot Purchasing
- Level 2: Competitively-based Incumbent Relationships
- Level 3: Preferred Supplier
- Level 4: Strategic Partnerships or Alliances.

See Table 6 on page 35 for further information on these levels.

This hierarchy of relationships often corresponds to the procurement activity that takes place at different levels of the company. Purchasing decisions made locally by individual plants are likely to be price-focused, while alliances and partnerships are often directed by corporate staff and consider many factors in addition to price.

While reputation is most at stake in closer relationships, note that EHS issues can have business importance at any level of supplier relationship. Product specs are often the greatest single source of EHS value; they can apply to any supplier. Anheuser-Busch has found that small construction and painting jobs purchased locally from spot suppliers can have high potential health and environment risks. Surveyed GEMI companies reported instances where legal liabilities were incurred or production

interrupted due to supplier EHS failures. Most of these examples involved spot or short-term relationships, typically with waste handlers and construction contractors. This experience supports procurement experts' observation that the most serious purchasing mistakes can be traced to vague requirements in the hands of marginal suppliers.

What differs across these levels of supplier relationships is not the business importance of EHS impacts, but the procurement tools available to communicate and assure standards and seek improvement, and also the aspects of supplier performance that are evaluated. In spot purchases the focus is almost entirely on the input purchased. In closer, longer-term relationships procurement has time and incentive to assess supplier process and organization. There are also means and incentives to assess supplier process when service providers are working on site. Table 7 summarizes the supplier aspects likely to be managed for each level of supplier relationship.

EHS-related assessment of supplier process and supplier management systems should be focused on: a) suppliers that pose particular risk because of the products and services they supply, and b) partnership and alliance suppliers whose performance is closely linked to the buying company's productivity, nimbleness, and reputation.

TABLE 7. SUPPLIER ASSESSMENT

What to assess?	Level of Supplier			
	1	2	3	4
Product quality	X	X	X	X
Transportation		X	X	X
Supplier process		X	X	X
Supplier management			X	X

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*TIP*

*WHICH SUPPLIERS AFFECT EHS REPUTATION AND RISK?*

Only some suppliers are likely to seriously affect EHS-related costs and reputation. These suppliers are likely to meet one or more of the following criteria:

- They face serious EHS challenges in their own operations. Their failure to manage these challenges could result in supply interruptions, greater costs, or legal liability for the buying company.
- They provide inputs that must be of predictably high quality for your operations to run with minimum waste, pollution, and danger.
- They work on your site as subcontractors, so their safety record affects your safety record; or they handle or receive your hazardous waste.
- They have expertise that could be tapped to improve your financial performance.
- They supply components that comprise a large part of the value delivered in your final product.
- They are one of a few major suppliers; thus their behavior may have a greater impact on your reputation than a multitude of minor suppliers who come and go.
- The public expects your company to have influence over them (due to geographical proximity, your specification of the products they make, their dependence upon you as their primary buyer, your dependence upon them as a primary or sole supplier, etc.).

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## SUMMARY FOR TOPIC THREE

Procurement can add value at many stages of product design and supply chain management, but your primary responsibility is in the selection of products and suppliers. The desired business outcome and the closeness of the supplier relationship will determine the best ways to procure superior EHS performance for products, services, and suppliers. There may be little procurement value in conducting a one-size-fits-all comprehensive supplier survey asking many suppliers questions about many aspects of EHS performance. Such a survey is not adequate to minimize legal liability, overkill for purposes of protecting reputation, and not particularly effective as a means to stimulate supplier commitment to continuous improvement. Topic Four focuses on methods of supplier assessment and the wise use of surveys.



## TOPIC FOUR

# HOW CAN I ASSESS AND IMPROVE SUPPLIER EHS PERFORMANCE?

*It is not our premise that all companies should evaluate all their suppliers on all possible EHS metrics.*

You should target for assessment those suppliers whose EHS issues directly impact operating costs, threaten continuity of supply, or threaten reputation or product quality. You should also find and cultivate alliance partners with best-in-class expertise to help them manage the business challenges posed by emerging EHS issues and opportunities. This section describes how EHS criteria can be integrated into existing strategic sourcing tools and processes. The section addresses four subtopics:

- Assessing supplier EHS performance (going beyond product characteristics to focus on the supplier's EHS performance and management systems);
- Collaborating with suppliers to continuously improve EHS and business performance along the supply chain;
- Addressing challenges posed by international operations; and
- Reshaping procurement practices through e-commerce.

### *Assessing suppliers' EHS performance*

Companies that plan to assess their supplier's processes and management systems should not re-invent the wheel. EHS-related criteria can usually be integrated with the procurement tools and steps already in use to screen, select, negotiate with, and monitor suppliers. And the EHS metrics should be consistent with and derived from the buying company's own evolving set of EHS performance metrics and priorities. This section will:

- Summarize typical procurement tools available at each stage of the procurement process;
- Describe how to select metrics to assess EHS performance of suppliers; and
- Explain how to verify performance on selected metrics.

### *Summary of available procurement tools*

The tables on the following pages summarize typical procurement tools and note their applicability to the different levels of supplier relationships noted below:

**LEVEL 1:** Spot Purchasing depends largely on price, and the interdependency between buyer and supplier is minimal.

**LEVEL 2:** Competitive incumbent relationships are in place for a longer period (e.g., a year), but involve relatively little substantive cooperation between the companies.

**LEVEL 3:** Preferred supplier relationships typically last longer than a year, and buyer/supplier collaborate to maximize value.

**LEVEL 4:** Strategic partnerships involve a mutual investment and sharing of benefits.

**TABLE 8. TYPICAL PROCUREMENT TOOLS BY STAGE IN PROCESS AND LEVEL OF SUPPLIER**

Level of Supplier:				TOOL	COMMENTS AND EXAMPLES
1	2	3	4		
<b>Stage 1: Pre-Screening Communications</b>					
	√	√	√	Policy Statements (EHS and Procurement Policies)	These can communicate buyer goals and set the tone for collaboration. Georgia Power has an Extranet web page that provide suppliers with key EHS information.
	√	√	√	Code of Conduct for Suppliers	These communicate how business will be done with suppliers, and often warn suppliers of standards and sanctions that may be applied if they fail.
	√	√	√	Minimum EHS Performance Standards	Most companies have contract language requiring suppliers to self-certify themselves in compliance with local requirements or supplier requirements.
√	√	√	√	Product Specifications	Product constituents and performance characteristics can be specified.
	√	√	√	Lists of Chemicals to Avoid	Kodak, Canon, Sony, Toyota, Ford and Volvo are among companies circulating lists of chemicals for their suppliers to eliminate or reduce.
<b>Stage 2: Qualifying and Negotiating</b>					
√	√	√	√	List of Pre-Approved Materials	Many companies screen materials onto pre-approved lists to speed purchasing decisions.
	√	√	√	Requests for Proposal	Requests for Proposal can include explicit evaluation criteria for the supplied product or service, and for the supplying organization. Many ask for safety performance statistics and evidence of continuous improvement.
	√	√	√	Surveys and Questionnaires	Companies require suppliers to complete self-assessment forms that vary widely in detail.
	√	√	√	Required Standards of EHS Performance	Standards are referenced in contract documents, and may be customized for level 3 and 4 suppliers, or suppliers of EHS-sensitive services such as waste disposal, construction, and remediation.
		√	√	Supplier Selection Criteria/Ranking	Anheuser-Busch includes EHS management systems as part of its existing supplier selection and certification program.  Texas Instruments goes beyond incident rates in assessing the safety performance of suppliers of key services, and considers corporate culture and top management commitment.  Volvo uses Environmental Priority Strategies tool to assess the energy and resource consumption, air, land and water emissions of materials it purchases.  Canon uses Green Procurement Standards to rate supplier corporate environmental structure and product specific impacts.
√	√	√	√	Pre-Approved Supplier Lists	The EHS department may screen suppliers and prepare lists for Procurement to use.
		√	√	Contract Negotiations	Halliburton has found it essential to include EHS professionals from both their own company AND contractor companies during contract negotiations.
<b>Stage 3: Monitoring and Continuous Improvement</b>					
		√	√	Audits	On-site audits are typically conducted for toll manufacturers, critical suppliers, and suppliers that dispose of waste. <i>See Ashland Case Study</i> on page 41.
		√	√	Regular Supplier Visits	Anheuser-Busch regularly visits packaging suppliers to review continuous improvement efforts and environmental management systems.
	√	√	√	Performance Reviews	These typically involve quarterly, six month, or annual progress and performance reports in formats developed by procurement, possibly with supplier participation.
		√	√	Collaboration to Solve EHS Problems	To increase recycling, Anheuser-Busch worked with a packaging supplier to develop standards for plastic binding on shipments. Motorola safety staff worked with a chair manufacturer to redesign chairs for better ergonomic performance.  Collins & Aikman (carpet manufacturers) reduced volume of volatile organic compounds (VOCs) by collaborating with a supplier to reformulate products and modify manufacturing processes.
		√	√	Supplier Training and Seminars	Herman Miller holds semi-annual conferences for all employees and suppliers on waste minimization, pollution prevention, lifecycle analysis and environmental design.
			√	Collaboration on R&D and New Product Development	Intel works with suppliers and cross-functional teams to design new semiconductor manufacturing tools that will operate with minimum EHS impacts.

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## CASE STUDY — *ASHLAND INC.*

### EVALUATION PROTOCOLS FOR CRITICAL SUPPLIERS

Ashland has established a formal program within its Responsible Care Management System to review the EH&S performance of its third-party providers of services including: toll manufacturing, waste management, container reconditioning, warehousing, common carriers and bulk liquid terminals. For each category of service, Ashland has developed a different review or audit protocol. A database on approved vendors is maintained electronically to coordinate use of the approved vendors by the Ashland businesses in all locations. Ashland has gained improved services, and vendors deem the oversight an advantage. They have become more sensitive to EH&S issues related to their services. Some have used the Ashland review as a selling point in their marketing to other customers. ■



#### *SUPPLIER REQUIREMENTS AND SUPPLIER EVALUATION ARE OFTEN MANDATED ACTIVITIES.*

For example:

OSHA Title 29, Section Title: 1910.119 Process Safety Management of Highly Hazardous Chemicals:

“(2) Employer responsibilities. (i) The employer, when selecting a contractor, shall obtain and evaluate information regarding the contract employer’s safety performance and programs.”

ISO 14001, Section 4.4.6 (c):

“The organization shall identify those operations and activities that are associated with the significant environmental aspects in line with its policy, objectives and targets. The organization shall plan these activities, including maintenance, in order to ensure that they are carried out under specified conditions by establishing and maintaining procedures related to the identifiable significant environmental aspects of goods and services used by the organization and communicating relevant procedures and requirements to suppliers and contractors.”

## Selecting metrics to assess supplier EHS performance

Many of the procurement tools that could be used to improve EHS performance in the supply chain require the use of metrics, (i.e., standards for measuring supplier's EHS performance). This section briefly reviews the range of metrics options, then presents guidance as to how companies can select a few metrics to assess and improve supplier performance.<sup>9</sup>

**There are many possible metrics to use.** For most procurement tools, EHS criteria can easily be added as yet one more aspect of quality to be managed. However, in several challenging respects EHS criteria differ from quality criteria. Unlike quality, EHS metrics are often focused on external impacts that the business has weak incentives and poor tools to measure. Many companies are wrestling with the challenge of developing their own set of useful and workable EHS performance metrics. Procurement departments should take advantage of lessons learned by their EHS colleagues in this struggle, and apply to suppliers a subset of the metrics the company has found workable and important to measure its own EHS performance.

Table 7 lists candidate EHS performance indicators. Note that many of the metrics correspond to the impacts already listed in Section Two's risk assessment matrix. For most of these indicators, five different questions could be used to assess supplier performance:

1. Is the supplier aware of this impact/issue?
2. Does the supplier have goals or policies regarding this impact?
3. Does the supplier have detailed plans in place to measure, manage, and improve this impact?
4. What is the supplier's performance regarding this impact during the most recent year?
5. Is the supplier's performance improving over time, and by how much?

Focusing solely on question 4 (the supplier's performance in the most recent year) can be ill advised. Infrequent accidents can seriously depress performance statistics in the year they occur. It is wiser to augment the evaluation of single-year performance measures with an assessment of performance trends over several years, and/or management systems.

The list of metrics from the table, multiplied by the five questions that could be asked, leads to 100 + possible metrics for assessing EHS performance. If individual chemicals are listed, and both corporate and facility-level assessment will be performed, the set of possibilities is even larger. Few supplier companies could assemble all this information, and few buyer companies could collect, track, assess, and verify it. To prioritize, we describe three filters below: 1) business value, 2) availability, and 3) procurement goal.

FIGURE 7. POSSIBLE METRICS

### Common Measures of Supplier Impacts

#### Natural Resource Use

- Amount of energy consumed
- Depletion of water resources
- Unsustainable resource use

#### Environmental Impacts

- Amount of bio-accumulative pollutants released
- Amount of ozone depleting releases
- Amount of global warming gasses released
- Amount of reportable chemicals released
- Water pollution, ground and surface
- Number and amount of reportable effluent spills, threshold

#### Safety Performance

- Does facility fall under Process Safety Management
- Fatalities, accidents/year per 100 employees
- Worker Comp costs, other insurance claims

#### Health Impacts

- Exposure levels for noise, toxic chemicals

#### Fines paid for EHS-related violations

- Notices of Violation (NOVs)

### Supplier Purchasing Decisions

- Based on best practices?
- Are upstream suppliers held to EHS standards?

### Supplier Process Characteristics

- Amount of specific chemicals used in process
- Amount of specific chemicals used on site
- Amount of toxic chemicals purchased
- Amount of ozone-depleting chemicals used

### Supplier EHS Management Systems

- Are there comprehensive goals and policies?
- Is there adequate implementation effort?
- Rate of recent improvements
- Annual public reporting of EHS performance
- Suggestion, incentive, education programs
- Self-certified consistent with ISO14001
- Third-party certification of EHS MS
- Baldrige-style scoring of environmental quality
- Describe recent challenges and accomplishments

### Normalization Variables

- Number of full time equivalent employees
- Revenues and value added
- Production unites or mass units

(9) For an extensive coverage of metrics, see the U.S. National Academy of Engineering recent publication: *Industrial Environmental Performance Metrics: Challenges and Opportunities*, at <http://books.nap.edu/catalog/9458.html>.

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**Filter 1: Prioritize indicators based on business value.** The first filtering criterion is importance or business value. Rate each metric based on its probable business value or strategic importance to your company. (If you have completed a risk assessment and prioritization exercise such as that described in Section Two, you have already determined which aspects or EHS performance are business-critical.)

Assign one of four importance levels to each possible EHS metric:

- Unimportant (not on our radar screen of risks that regulators, courts, or customers care about) – ignore these aspects of performance for now;
- Relevant (low liability, low cost, low marketing benefit) – an appropriate goal is to have suppliers meet minimum standards, comply with laws;
- Important (area of significant risk or potential benefit) – an appropriate goal is to optimize performance in the supply chain; or
- Critical (high risk issue) – the appropriate goal is near-zero probability for major disruption, liability, or public relations crisis. Bear in mind that these metrics may be critical for only a few suppliers, and important or relevant for others.

Now consider only the metrics judged critical and important for at least some suppliers. (The relevant issues can be handled with published standards and boilerplate language in contracts). Each critical issue will have to be actively monitored with major suppliers, and verified in a less costly way for relevant minor suppliers. If the total set of critical and important issues is small in number, you may be able to assess them all. However, if there are more than a few important issues, you may simplify in one of several ways:

- Focus on one or two important metrics as proxies for the larger set, with the assumption that performance on a few key indicators is a fairly reliable indicator of company EHS capability and commitment. Preferably, focus on the indicators suppliers are most likely to be tracking and reporting already.

- Focus on the quality of the supplier's Environment, Health and Safety Management System, with the assumption that a good management system will translate into better performance on a myriad of metrics that are not directly assessed. Procurement departments are skilled evaluators of management systems. (However, it can be difficult to remotely assess the quality of the management system, except by looking at the trends for a few easily tracked performance metrics. Certification to a standard for management systems does not guarantee performance. This topic is explored in more detail below.)
- In work with current first-tier suppliers, focus on one or two important metrics at a time, then after a year or two shift focus to the next important issues. Eventually each important issue will have its turn to be emphasized.

For all but the most critical suppliers, focusing on a few metrics as proxies for others is a practical and adequate strategy. After all, for most metrics and most suppliers, the business goal will be to have suppliers meet minimum standards most of the time, and demonstrate better than average awareness and progress on EHS matters. For most suppliers most of the time, EHS performance will be only one weighted factor among many used to select and assess suppliers. While near-perfection in all aspects of supplier EHS performance from all suppliers would be nice, it is not a feasible business goal. Using one or two selected metrics may be a reasonably effective means to weed out the most problematic suppliers and encourage attention to EHS performance.

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**Filter 2:** Prioritize performance indicators based on their availability. If possible, use metrics that are easy to obtain and verify. Try to limit yourself to:

- Quantitative information suppliers can easily assemble (preferably data they already collect and report to governments or industry groups);
- Qualitative information that can be conveyed in short written answers and assessed in face-to-face meetings; and
- Information that can easily be verified by checking against public records, accepting third party certification, or conducting on-site audits.

The problem with an emerging area of performance measurement is that there are frontiers with important business value where government is not yet collecting information and third party certification mechanisms are in an early stage of evolution. If you need cutting-edge indicators despite probable difficulty obtaining them, consider four alternatives:

- Work with industry groups to develop common tools, standards and certification methods. For example, the Responsible Care Program of the American Chemistry Council provides a comprehensive means to evaluate performance of chemical suppliers.
- Ask suppliers only for indicators that you as a buying company are already calculating internally. Share your tools and approach.
- Consider using another more available indicator as a proxy for the preferred indicator.
- Work with a group of suppliers to collaboratively plan ways to measure the new metric.

**Filter 3:** Choose indicators based on procurement goal. Select metrics appropriate to the stage in the procurement process and the level of relationship. For an initial screening of new suppliers, use a few readily available metrics. For contract provisions, use easily verified quantitative metrics. In discussions and audits with key first-tier suppliers, you can afford to touch upon a greater range of metrics, and more qualitative ones.

### *How much should you focus on management systems?*

Can supplier assessments be simplified by focusing on the supplier's Environment, Health and Safety Management System (EHSMS)? An EHSMS should include its own impacts and risk assessment, goals, plans to make improvements, and metrics to measure them. In theory, a good supplier EHSMS should lead to continuous improvement and adequate risk management, sparing procurement effort to assess details of performance. Thus the supplier EHSMS may itself be judged to be an important or critical metric, or a good proxy for a number of important metrics. The question then becomes how to assess the quality of a supplier's EHSMS.

If your procurement department has worked closely with suppliers on quality issues, your staff is adept at assessing management systems through periodic progress meetings and site visits with major suppliers. For suppliers not receiving visits, it may be difficult to determine whether the management commitment to continuous improvement is keen or paper thin. Sample questions that could be asked include:

- Do you have a formal Environmental or EHS Management System with specified goals, procedures and metrics?
- Which significant EHS impacts or issues have you assessed?
- What progress can you demonstrate for each?
- What indicators do you have of employee involvement levels?
- How does management review and improve the management system?

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There are several third-party certification or assessment systems that may be used to judge the quality of an EMS despite company to company variations in content.

- ISO 14001 is an organizing structure for environmental management. It specifies guidance on scope, process, and documentation, but entails no specific environmental metrics. Companies may self-certify that their EMS complies with ISO requirements, or they may obtain third-party certification from approved auditors. Since ISO 14001 was published in 1996, nearly 10,000 companies or facilities have obtained certification, mostly in Japan and Europe.
- In 1993 the Council of the European Union passed the Environmental Management and Audit Scheme (EMAS) regulation. While a voluntary program like ISO 14001, some consider EMAS to be a stronger indicator of continuous improvement because of its environmental auditing and public disclosure requirements. A similar system is the British Standards Institute's BS 7750.
- A different approach which encompasses both management system and environmental performance is based on the quality assessment system developed to support Baldrige quality award programs. Companies submit a detailed application and receive a site visit from a panel of trained volunteer auditors who by consensus score the company's environmental performance quality. Applicant organizations also receive detailed feedback on possibilities for improvement. Using comparisons to a best-in-class models, points are awarded with a maximum total of 1,000 for scope of the management system, the effectiveness of its deployment, integration of objectives with operations, and for progress demonstrated. The result is an ordinal scale that can be used to compare companies across industries and over time. New Mexico has adopted this model for its Green Zia program of environmental excellence awards, and Massachusetts is following suit. ISO 14001 compliance in itself is only a small part of the potential score.

The auto industry has taken the lead in requiring ISO 14001 certification of its suppliers. A recent study of ten high tech manufacturers, utilities, and chemical companies showed only one required registration for its suppliers, while another four encouraged suppliers to certify.<sup>10</sup>

While third-party certification is one means to verify quality of an EMS, there are several drawbacks to requiring it of suppliers. First, it is expensive, particularly for smaller suppliers. Ford reports its own ISO 14001 implementation costs ranged from \$27,000 to \$85,000 per plant plus 3,800 to 7,800 internal hours.<sup>11</sup> Second, ISO 14001 certification does not guarantee compliance or improvement for specific critical metrics of interest to the buying company. Nor does it verify that suppliers are best-in-class optimizers. Therefore many procurement departments have not seen enough value in ISO 14001 certification to require it of their suppliers. Whether or not an EMS is certified, procurement departments seeking best in class suppliers should refer to a more comprehensive rating system (the Baldrige approach) or ask their own questions concerning effective deployment and improvement results.

### *How to verify performance on selected metrics*

In a recent benchmarking survey completed by twenty GEMI member companies, respondents reported the following mix of verification methods in the process of selecting suppliers:<sup>12</sup>

- 37% had suppliers self-certify compliance with regulatory requirements;
- 15% asked for self-certification to company standards;
- 6% checked with regulators to obtain or confirm company information;
- 18% used site audits against regulations;
- 15% performed site audits against company standards; and
- 9% assessed supplier management systems.

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(10) ISO 14001 and Environmental Goal Setting: Promises Kept, Switzer, Ehrenfeld, Milledge, *Environmental Quality Management*, Winter 1999.

(11) Presentation by R.J. Brodie, March 1, 2000, Yale School of Forestry and Environmental Studies.

(12) Results viewable at [www.gemi.org](http://www.gemi.org), under title of benchmarking surveys.

Assessment involves both obtaining and verifying information. Table 9 below shows methods to accomplish these goals that are appropriate to the importance of the metric and the closeness of the supplier relationship. The shaded cells show where supplier questionnaires or surveys may be productively used.

Self-certification by suppliers is a control strategy that works on a low-cost deterrent principle. Buyers have a published standard to protect their reputation, and suppliers know the buyer can cancel their contract if they fail in a glaring way to meet standards.

Third party certification can provide information and verification at the same time. The more supplier performance can be certified by reliable third parties, the less work the procurement department has collecting and verifying information. Third parties can be used to verify compliance for peripheral suppliers, but for key suppliers site audits are advised for additional protection. Procurement can also cut its workload by asking the EHS department to create a pre-approved list of suppliers (*See Kodak case study*).

Use industry associations when possible. Several chemical companies ask suppliers to complete a half page survey if they are already members of the American Chemistry Council (ACC), and a three page detailed survey if they are not. Thus suppliers who have already reported to ACC are spared the redundant reporting to a particular buyer. Forest Product companies are beginning to report EHS performance information to their association.

### *Critical risks and critical suppliers*

On-site audits or on-site supervision are indispensable for critical suppliers. Critical suppliers include on-site subcontractors, hazardous waste disposal providers, contract manufacturers, other first-tier supplies deemed easily supervised by reason of integration or proximity, and single-source suppliers of important inputs.

**TABLE 9. CHOOSING TOOLS TO COLLECT AND VERIFY EHS PERFORMANCE METRICS**

*Note: Shaded cells show where supplier survey or questionnaires may be productively used.*

Importance of metric	Many less important suppliers (Level 2)	Relatively few, very important suppliers (Levels 3 and 4)
<u>Relevant</u> metrics: suppliers should meet minimum standards	Publish standards; no active verification. Do not ask. Deal with substandard behavior if and when it occurs and is noticed, by dropping supplier.	Publish standards, ask for self-certification of compliance, spot check during audit.
<u>Important</u> metrics: suppliers should optimize performance	For a <i>small set</i> of metrics, request self-certification and annual reports. Verify by spot check against public records.	For <i>all</i> important metrics get progress reports, discuss in periodic meetings, check during audits.
<u>Critical</u> risk or goal	Use credible third party to measure or verify performance.	Verify by periodic audit, discuss in periodic meetings.



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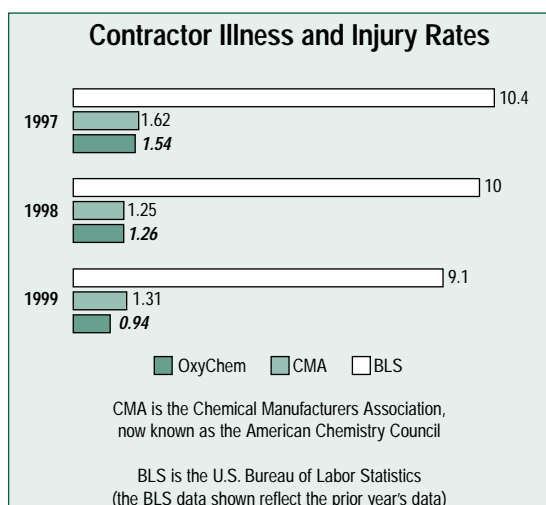
## CASE STUDY — OCCIDENTAL CHEMICAL CORPORATION

### OXYCHEM CONTRACTOR HES PROGRAM

Occidental Chemical Corporation (OxyChem), a subsidiary of Occidental Petroleum Corporation, is a leading manufacturer of commodity chemicals, vinyl, petrochemicals and specialty products. It is subject to OSHA Process Safety Management (PSM) and EPA RMP regulatory standards, and to the American Chemistry Council's Responsible Care, Employee Health and Safety Code requirements – all of which require evaluation of contractor safety performance. OxyChem's Contractor Quality Management Program meets or exceeds these standards. It outlines how contractors are selected, trained and managed to ensure they perform their jobs in a safe, environmentally responsible manner. The contractor selection process includes a review of the contractor's:

- Injury/illness data for the last three years;
- Written safety and health plan; and
- Substance abuse program.

References are required and background checks are done to determine the contractor's past health and safety performance. The contractor must complete pre-job safety and health orientations and training before being allowed to work. Monthly injury/incident data is tracked for all contractors as it is for OxyChem personnel. (See chart for recent trends.) Safety performance is monitored at the job site. Overall safety performance evaluations are conducted at the end of the job for project contractors and annually for resident contractors. Contractors are required to ensure that subcontractors meet the same EHS pre-qualification requirements as the prime contractor.



OxyChem requires contractors to perform to the same standards in health, safety and environmental responsibility that it requires of itself. Contractors fully participate in OxyChem's health and safety programs. They participate on plant safety committees and incident investigation teams. When contractors do not meet OxyChem's health and safety expectations, they are informed of the shortcoming, counseled on how to improve, assisted where appropriate, and if necessary, removed from the project.

With OxyChem's strong involvement in OSHA's Voluntary Protection Program (VPP) initiative, there is solid support for resident contractor participation as well. Currently, two OxyChem resident contractors have achieved the OSHA Demonstration designation and others are preparing for their on-site evaluations. As one OSHA VPP Team member noted recently during a contractor evaluation at OxyChem's Taft, Louisiana location, "We can not tell the difference between OxyChem employees and the contract employees," indicating how well residential contractors have been integrated in the safety and health program at OxyChem's sites. Another indicator of this integration is the illness and injury rate for OxyChem's contractors.

In 1999, OxyChem enhanced the Contractor Quality Management Program to include specific environmental considerations in the selection, on-site activities and periodic reviews of contractors. Such considerations include past environmental performance, training in sound environmental work practices including leak prevention, waste management, and pollution prevention efforts consistent with OxyChem's and regulatory requirements. ■

### Wise use of surveys.

The impulse to survey suppliers is understandable, particularly when you start a new supply chain EHS management initiative and are not yet clear on what metrics constitute the best set. Supplier companies complain of being inundated by often-long surveys issued by their customers probing many aspects of EHS performance, asking questions with no clear use. Some buyers ask suppliers for metrics they themselves have not compiled for their own facilities! The effort involved to complete these surveys is substantial. The result may be more frustration without more commitment. British firms studying the use of surveys concluded:

*“Indiscriminate requests for large quantities of information from suppliers will be costly in terms of resource use not only to them but also the requesting organizations...The temptation may be to request information about all aspects of the supplier’s management, processes, raw materials and wastes. Are customers sure that such detailed information is needed?”*

*The acid test must be whether processes to use the information have been defined. The information must have value if it is to justify the cost of production and the cost of collection and analysis.”<sup>13</sup>*

Detailed questions about management systems, corrective actions, and other qualitative measures of performance may be better assessed in meetings. British companies collaborating on this topic developed Table 10: Pros & Cons of Different Data Collection Methods.

As the practice of supplier EHS assessment matures, there are likely to be more standard formats for public reporting of EHS performance, more voluntary public reporting, more easily accessed databases of already-reported information, and more widely recognized third-party certifications. All these developments will reduce the need for companies to report to each other on paper information they may already have reported and had verified.

TABLE 10. PROS & CONS OF DIFFERENT DATA COLLECTION METHODS

Method	When	Pros	Cons
Meetings and Structured Seminars	From the Beginning and Throughout	Informal Opportunity for clarification Opportunity for feedback Key to partnership style Builds commitment and understanding	Hard to make and systematic Resource intensive Information collection less detailed
Questionnaires	Contract Monitoring Vendor Rating Preliminary Supplier Evaluation (selectively)	Consistency Resource efficient Large quantities of information Flexible Useful where purpose is clear (with training)	Open to misinterpretation Do not build commitment and understanding Mixed quality of information May require validation
Site Visit	Supplier Evaluation Vendor Rating	Best quality of information Useful for collecting large volumes of information Opportunity for suppliers to share benefits/value Build commitment and understanding Can be independent Can be systematic/structured Opportunity for detailed examination and problem solving	Resource intensive Can be intrusive unless handled correctly

(13) *Buying into the Environment*, guidelines for integrating the environment into purchasing and supply, collaborative report issued in the UK by Business in the Environment, the Chartered Institute of Purchasing, and KPMG’s National Environment Unit, page 35.

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### *Target a survey effort*

Customer triage and a modular survey approach can be used to focus survey effort effectively. First, separate suppliers into three groups based on information you already have concerning the inputs they provide (their likely EHS burden) and the volume and criticality of your purchases from them.

- **Group One:** Suppliers likely to be low risk/low opportunity sources of business value related to EHS performance. Do not query them on management systems or EHS performance. If necessary, ask them short product-specific or process-specific questions (e.g., does your product contain mercury? Does your product contain old-growth wood not certified to come from a sustainable managed forest?)
- **Group Two:** Suppliers for whom risk and opportunity need more assessment. Survey them in a two-step process. First, ask them to complete a one-page short and simple screening questionnaire that they can self-score. This survey would ask about common risk indicators, and common indicators of EHSMS manage-

ment effort such as EHSMS certification, environmental awards, and annual public reporting of EHS performance. If their self-computed score exceeds a threshold, ask them to complete a longer detailed survey and a recent trend performance report for key indicators. Based on their answers plan site visits or issue invitations to seminars.

- **Group Three:** Suppliers likely to be high risk/high opportunity sources of business value. In general, rely on audits, site visits and progress review meetings for these suppliers. If you are gathering information for the first time, you may ask them to complete a detailed survey. You may also ask them to annually complete or update a standard recent trend performance report for key indicators. This standard form asks for information companies are already likely to report to governments or industry groups. It could be filled out via the Internet, and reside in a database that might be shared among a consortium of companies.



### *EFFECTIVE SURVEYS*

- Analyze metrics first. Ask only about the metrics you consider important or critical.
- Do not ask about potential problems if you are not prepared to remedy those problems by choosing other suppliers or helping current suppliers improve. (This only increases your liability – the same advice applies to site audits).
- Include in contract language the right to spot check or obtain additional verification. If there are no practical plans or means to verify information, consider dropping the question.
- Use only questions that can be phrased with minimum risk of misinterpretation and test this assumption on a small sample of respondents before distributing hundreds of surveys.
- Favor focused questions with yes/no answers or quantitative answers. (If a question requires a long answer, it is probably better to ask it in an interview or meeting.)
- Have a plan for using the information and share with suppliers how the requested information will be used. Options include: to select suppliers, to rank suppliers, award suppliers, reward suppliers, give suppliers fair warning about areas where they fall short, prepare life-cycle estimates, and/or to plan or target supplier development efforts.
- Use surveys when they are the best information collection tool for your purpose.
- Consider the alternatives, such as review of annual reports and publicly reported information.

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## CASE STUDY — EASTMAN KODAK COMPANY

### KODAK'S EFFECTIVELY FOCUSED SUPPLIER SURVEYS

Eastman Kodak Company encourages a life cycle approach, and has organized its expectations for suppliers accordingly. For the materials stage of product life, Kodak standards state:

*“A supplier should assure itself and Kodak that the types of materials (including packaging) being provided to Kodak do not contain nor are manufactured with certain “unfriendly” materials (like CFCs, polybrominated flame retardants, or heavy metals). Materials are to be selected which have a likelihood of being recycled and are to be identified by common material type (e.g., use of ISO 11469 for marking plastic parts).”*

Kodak compiled a list of “chemicals of concern” based on regulatory requirements in the Great Lakes watershed and requirements of global markets. At first, each product development team sought to verify the compliance of their suppliers. This process was inefficient and difficult to monitor; it also resulted in some suppliers receiving multiple inquiries from Kodak. Upper management (Corporate VP, Chief Purchasing Officer) assembled a functional team made up of members from HSE, Purchasing, and Quality Assurance to develop a streamlined process.

Kodak’s new supplier certification process is simple and focused. Referencing a two page listing of chemicals and Kodak requirements, all suppliers fax back a one-page certificate, self-certifying compliance or listing their current exceptions. Kodak has an internal process to handle nonconforming cases. Possible outcomes include: redesign of a material/part/product; the substitution of a material with one that conforms; the discontinuance of the relationship with a supplier; or the temporary acceptance of the supplier’s goods.

As this process is not yet a year old, its benefits are yet to be quantified, but cycle time and cost improvements are anticipated. With the new process, if a supplier has already been certified, that information would be readily accessible to all parties, and there would be no need for individual project teams to verify supplier conformance.

The HSE staff monitors, collates, and interprets global HSE factors. In this instance, they also developed the list of materials sent to each supplier. Informal solicitation of feedback from suppliers has been used to gauge the impact of the assessment process, and to influence adjustments which would make the process more effective. ■



#### SUCCESSFUL COLLABORATION

Companies have identified several tips for fostering effective collaboration toward continuous improvement:

- Integrate suppliers early and often into product, process and strategic decisions that impact them.
- It is best to collaborate at multiple levels, and essential to involve the technical personnel involved in planning and managing day to day operations.
- Have clear, written ground rules and expectations for audits, periodic reviews, seminars, etc.
- Plan for face-to-face performance review meetings on a periodic basis (often quarterly or twice a year).

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### *Collaborating for continuous improvement*

Assessment does not necessarily build commitment. In addition to (and often separate from) supplier assessment activities, many companies sponsor development activities for their network of suppliers. For example, Intel has since 1993 held annual Supplier Days at which more than 700 equipment suppliers come together to discuss Intel's directions and expectations, including those for EHS. Motorola, GM and Ford sponsor universities open to their own and supplier employees. Most companies try to cultivate long-term relationships with a reduced number of suppliers, with one goal being the frank and fruitful communication that mutual trust allows. Both supplier and customer companies stand to gain from collaborative effort and information sharing with the goal of improving their environmental performance and the environmental profile of their products.

Improving EHS performance is a topic well suited for communication within supplier networks and between supplier and customer. Like quality, it is relevant to virtually all players, and can be discussed in useful detail without forcing potential competitors to reveal proprietary information. Thus EHS issues are easily integrated with the varied communications and relationship management tools companies use to cultivate continuous improvement in their supply chain.

### *International challenges*

One of the major challenges in the globalization of companies is how to maintain high EHS standards in activities and simultaneously keep a competitive edge. There are many challenges, including:

- Logistics of visiting distant suppliers and communicating in different languages;
- Adapting operations to different climates and cultures;
- Managing varying levels of regulation. American companies may face different levels of regulatory requirements in Europe, while in developing countries EHS regulations are nonexistent or less restrictive than those found in more developed countries. Company global standards may be needed where there are inadequate local standards to reference in self-certification of compliance;
- Managing the dilemmas of different standards around the world. Multinational corporations operate facilities in countries with quite different wage rates and different standards for practices and products. The weight of the evidence suggests that multinational corporations typically raise standards of EHS performance in developing countries.<sup>14</sup> The issue is how much to raise them, and what leverage there is to accomplish this when it involves asking suppliers to do "extra" things they are not accustomed to doing; and
- How do you implement EHS performance standards for suppliers internationally particularly when there is only a single supplier and your leverage is minimal?

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(14) See GEMI's "MNC" study detailing how multinationals raise standards abroad.

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## Using e-commerce

Business-to-Business relationships are entering a new era of e-commerce and businesses are becoming increasingly inter-linked through electronic media. Procurement is being fundamentally affected as internet-based procurement systems reduce the average fulfillment cycle, lower material and service costs and significantly lower administrative costs associated with supplier search, product feature assessment, process comparison, order entry, status tracking and payment processing. For example, ten companies who are members of GEMI are currently beta testing a web-based, user-friendly computerized chemical screening tool that predicts the persistence, bioaccumulation, and fish chronic toxicity (PBT) of many chemical substances. Sponsored by the U.S. EPA, this tool can be used to screen both new and existing chemicals, compare them to each other, and to regulatory criteria for Toxic Release Inventory and the Pre-Manufacture Notice requirements of the Toxic Substance Control Act (TSCA).

The Internet and electronic communication tools can also be used to expedite and improve the assessment of and communication with suppliers. Companies that have developed web-accessible reporting databases for collecting EHS performance metrics from their own sites could quickly expand those systems to collect the same information from suppliers.

At this point, the following developments seem likely:

- Buying organizations will collaborate to share information about suppliers, reduce supplier evaluation costs, and obtain quantity discounts. In such collaborations, a key issue will be the fate of criteria other than price. Will higher EHS or social standards prevail if they are needed by some but not all of the collaborating companies?

## SUMMARY FOR TOPIC FOUR

Managing EHS performance in supplier relationships does not require new or unfamiliar tools, but the integration of EHS criteria into existing communication and evaluation mechanisms. Because EHS performance involves so many different types of impacts, the challenge is to select an efficient set of criteria to assess suppliers. To avoid burdening suppliers, carefully target surveys and integrate them with other means of verifying and improving supplier performance.

The need for third-party certifications of EHS quality for products and suppliers is likely to increase, to allow for non-price qualities to be obtained through net-enabled purchases.

- Increased ability to buy on the spot market, through buying consortia, and through strategic partners will allow major companies to greatly reduce the number of Level II suppliers they manage. First tier suppliers with technical expertise are unlikely to lose ground to spot purchases, and will be even more closely integrated with their buying companies through e-mail and Intranets. However, where the principal advantage a first-tier supplier provides is the “middle man” service of managing information or smaller suppliers, the make or buy decision may be reversed to favor in-house management using the Internet.
- Within three years or less, fairly standard EHS performance information for companies will be easily retrieved from web-accessed central databases maintained by states, industry groups, advocacy groups or companies like Dun and Bradstreet. Some will republish numbers already in the public domain. For example, the Environmental Defense Fund draws upon data from two federal agencies to publish a “Chemical Scorecard” website ranking some 17,000 sites by cancer risk from TRI releases.<sup>15</sup> Others will accept then spot-check company supplied data. E&Q Rating AB, a new subsidiary of Scandia Insurance Co., plans to roll out a web-based EHS quality rating based on a 250 question on-line survey, validated by public declaration and random spot checks.<sup>16</sup> A questionnaire will no longer be the most efficient means to learn about a supplier’s EHS performance.

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(15) Business and The Environment, March 2000, page 10.

(16) Ibid., page 2.

## TOPIC FIVE

# HOW CAN I IMPROVE EHS PERFORMANCE THROUGH SUBCONTRACTING?

*This topic describes how companies can outsource EHS-intensive functions to their suppliers to better focus on core competencies and improve their own bottom line.*

Often suppliers have valuable specialized knowledge and expertise, that enables them to identify cost and risk reduction opportunities that their customers may not realize on their own. Suppliers sometimes provide project funding, in return for receiving a share of the savings they achieve. In many instances, outsourcing of non-core business elements can result in immediate efficiency gains and increased profits, with minimal risk to the customer company.

Outsourcing is more than subcontracting, in that outsourcing is more of a partnership between the service provider and the customer. The closer the collaboration, the greater the opportunities for improved EHS performance and cost savings for all parties. The following factors can contribute to an effective partnership:

- *Foster communication.* Communication needs to be open, two-way and frequent between the supplier and the customer. The expectations for the partnership need to be clearly established and communicated to both parties.
- *Negotiate contracts that allow for flexibility and creativity.* It is essential to set up the contractual relationship in a way that rewards proactive, results-oriented innovation and that drives continued cost reduction. When an on-site supplier develops a truly customer-oriented approach, they may come to identify areas of potential cost savings that lie outside their normal scope of involvement with their customer. A contractual relationship that addresses how those savings will be shared, “gainsharing” is essential.
- *Protect intellectual property.* The agreement/relationship should be structured so that the supplier retains the ability to develop partnerships with other customers, who may be competitors of one another. Likewise, it is critical to protect the customer’s privacy, since the supplier is intimately familiar with aspects of their day-to-day operations.

Outsourcing shifts the procurement focus beyond products to a service-based relationship. The examples and case studies that follow show how companies are outsourcing EHS-related services that had been traditionally handled in-house, such as chemical management, waste management, and energy management.

### Outsourcing chemical management services

In the traditional model, manufacturers purchase only chemical products from their chemical suppliers, and the products are sold by volume (\$/Pound). The customer retains responsibility for managing the use and handling of the chemicals. The supplier's profit is based on selling as much product as possible; the customer's profit is based on buying as little product as possible. Thus, the supplier and the customer are at odds. The net result is that suppliers have no incentive to help their customers use their products more safely or efficiently – in fact, just the opposite. The supplier's market differentiation strategy is price based – the lower they can drive their unit price, the more they stand out. There is no partnership relationship here

– just purchase orders. There is little collaboration and little incentive to collaborate.

As companies search for innovative ways to reduce costs and limit EHS liabilities, they are restructuring their relationship with suppliers and contracting more and more of the chemical services and chemical management responsibilities. Table 11 describes alternatives for structuring contracts and incentives.

Several leading manufacturers have hired chemical companies to manage their chemicals through the entire procurement and production phases of the supply chain.<sup>17</sup>

TABLE 11. CHEMICAL SERVICES INDUSTRY MODELS

Model	What is for Sale?	How is it Priced? Net Result for Cost Savings and Environmental Opportunities
\$/lb.	Chemical is sold by volume	Suppliers have no incentive to help customers use their products efficiently - in fact, just the opposite.
\$/lb. + Services	Chemical is sold by volume Higher price includes some consulting services	Services associated with the proper use/handling of the chemicals are a more prominent component of the relationship. These services might involve logistics, ESH/compliance, and applications. This strategy is an initial market differentiator for the supplier.
Chemical Management	Chemical is sold by volume Management services sold on itemized basis	Supplier brings greater expertise to performing chemical management activities previously handled by customer. Management fee reduces incentive to increase chemical sales for higher revenues. This model is good first step towards increased collaboration.
Shared Savings	Supplier is paid a fixed fee to meet the "chemical performance needs" of the customer.	Supplier and customer's goals to reduce waste and save money are financially aligned. Both parties make money by reducing chemical use over time.

(17) See also, Reiskin, White, Johnson and Vota, 1999: "Servicizing the Chemical Supply Chain" *Journal of Industrial Ecology*, 3(2)1931. Available at sample articles page of JIE at <http://mitpress.mit.edu/journals/JIEC/sample-article.htm>



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## CASE STUDY — *MOTOROLA, INC. & ASHLAND INC.*

### MOTOROLA'S COLLABORATION WITH ASHLAND SPECIALTY CHEMICAL COMPANY

Motorola and Ashland Specialty Chemical Company have developed a collaboration that places dedicated Ashland staff on site 24 hours, 7 days a week. Ashland handles all aspects of chemical management, including product evaluation assistance, supplier selection assistance, ordering, receiving, storage, inventory control, recycling, treatment, disposal and compliance. In other words, Ashland takes over the procurement, logistics, and operations and waste management where chemicals are concerned. This integration of procurement and materials management delivers many advantages, including:

- Alternative material selection;
- Optimized container material and size;
- MSDS management for all chemicals;
- Efficient logistics (fewer deliveries, fuller truck loads);
- Effective order quantities and compliance in storage;
- Usage reduction through extended vat life; and
- Waste minimization (Ashland reduced disposal costs significantly by finding markets for some chemical “wastes,” and by recycling or reusing containers.)

Motorola benefits also include fewer interruptions to production, enhanced and more skilled coverage, safer products, modest discounts on prices, reduced administrative tasks, and some liability transfer. In addition, the on-site lab operated by Ashland provides value when issues of potential product contamination arise.

Ashland and Motorola employees work together as a team. Daily production meetings are held, supplemented with weekly meetings on continuous improvement, and bi-monthly meetings mapping paths to quality improvements. Both companies mentioned trust and ability to work together as requirements for an effective partnership. In its procurement process, Motorola sought a partner with a broad range of services, EHS expertise, financial strength, excellent people and systems, and a commitment to be a market leader. ■

## CASE STUDY — *ELI LILLY AND COMPANY*

### CHEMICAL INVENTORY MANAGEMENT FOR RESEARCH LABS

At Eli Lilly's research labs, managing the inventory “case stock” of numerous pint and gallon-sized specialty solvents was inefficient and difficult. There was a large inventory of chemicals that were seldom or never used. Multiple “pigeon holes” were created by scientists to ensure themselves an adequate supply of solvents for their own projects. Lilly asked its vendor to administer the system.

The vendor repurchased all of the chemical inventory and reorganized the storerooms. They inventoried the labs and assisted in reducing the on-site inventory from 3,400 gallons of various solvents (all owned by Lilly) to 1,400 gallons (mostly owned by the vendor). Now Lilly scientists have immediate access to the chemicals they need, without the cost of carrying inventory. The vendor rotates stock and provides right sized quantities to satisfy orders. On-site vendor staff who manage the system are billed at a reasonable rate with the overall benefits being dramatic – from both financial and safety perspectives. Scientists have seen no reduction in service levels. Following its success at Lilly, the vendor is now offering this service to other customers. ■

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## CASE STUDY — *GENERAL MOTORS*

### CHEMICALS MANAGEMENT FOR GENERAL MOTORS

In 1987, GM pioneered a new approach to chemicals management in its Romulus, Michigan manufacturing facility. GM contracted with a single first-tier supplier to manage all aspects of chemical use in the plant. The supplier would place staff at the plant, order chemicals, receive shipments, control the use of chemicals in operations, and manage waste disposal and reporting. The supplier's charge was to optimize performance over the entire chain of logistics and materials decisions concerning chemicals. Supplier profits were linked to system performance instead of chemical sales. Thus the supplier's accountability for system efficiency zoomed from zero to 100%. The experiment was judged a dramatic success, and led to similar relationships being implemented at most of GM's North American plants. The chemical management supplier typically furnishes an on-site lab, procurement, storage, process control, process improvement, MSDS management, tracking and reporting down to the machine level, and additional services specified by specific plants. GM sees these vendors not as commodity suppliers but as expert partners in design and operation.

There have been many benefits for General Motors:

- GM deals with only one chemical supplier and can better focus on its core business. Chemical usage has been reduced by 12%. The number of different chemicals and chemical sources has also been reduced, as have GM administrative functions.
- Supplier participation in process and product design has reduced product costs and improved process controls.
- Both hard (easily quantified) and soft costs of chemical management have been cut, and environmental stewardship improved.

One of GM's chemical management companies, Haas, portrays the arrangement as a triple win with advantages for the environment, the buyer, and the supplier. The purchase price is only 10% of the total cost of using, controlling and disposing of chemicals. Thus, post-purchase chemical management is the major source of savings for GM and the major source of Haas profits. Haas has much more profit potential as a provider of expert services than as a commodity supplier. "We make our money on process improvements." To re-orient its staff toward service goals, Haas had to remove commissioned sales people from some plants, change incentives from per gallon to per vehicle measures, and consistently audit its operations during the first few years.<sup>18</sup>

Key success factors identified by GM and its supplier include an integrated, whole-system approach that involves supplier experts along with GM engineering, manufacturing and procurement personnel in collaborative efforts to evaluate and select chemicals and improve processes. Giving core responsibility and strong incentives for whole system optimization to one party means that possible improvements do not "fall through the cracks" between more parochial departmental perspectives. ■

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(18) Haas presentation at Supply Workshop at GEMI annual conference, March, 2000. GM, Motorola, and Ashland managers also presented supplier and buyer perspectives at the workshop.

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### *Outsourcing waste management services*

It is also common for companies to subcontract the management of wastes, sometimes including hazardous waste with its special storage, shipping, and documentation requirements. Companies are contracting with waste management companies not just to dispose of wastes generated on-site, but to design and operate a comprehensive resource recovery program. The supplier may:

- Design, supply, install, and maintain all equipment;
- Develop a market for recovered resources; and
- Recommend system improvements and innovations to improve resource recovery rates.

The Intel fabrication plant in Ireland has achieved one of the highest recycling ratios in the industry by hiring a recycling expert, Green Star, to manage its waste. Green Star maximizes separation at the source by placing bins for different types of waste in each workspace, collects from those bins, arranges shipment, and develops new products to recycle materials for which there is no apparent market.

The issue of liability for hazardous waste must be carefully handled in contract negotiations. Halliburton manages hazardous waste for several large clients. Halliburton minimizes its own Superfund liability by requiring that the clients select the disposal sites. Halliburton then manages on-site accumulation, shipment, and documentation. Halliburton is also careful that its subcontractors ship no waste from the sites it manages. The company believes that EHS professionals are needed at both sides of the negotiation table when waste liabilities are negotiated.<sup>19</sup> Ashland Environmental Services takes another approach, accepting liability for hazardous wastes upon transfer.

### *Outsourcing energy management services*

Energy conservation has direct bottom line benefits and environmental benefits through reduced emissions of carbon dioxide. Since the energy crisis of the 1970s, energy service companies (ESCOs) have offered to design and finance energy conservation improvements in major facilities, in exchange for a share of the anticipated energy savings. These Energy Saving Performance Contracts have produced high-payback energy savings with improvements the customer company was unlikely to make given limited financial and management resources and often-larger opportunities within its core focus. ESCOs are now offering additional services, using sophisticated electronics to optimize electricity loads, and helping customers purchase and sell electricity in fast-changing deregulated markets.

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(19) Telephone interview with Robert Sherman and Kent Malone, May, 2000.

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## CASE STUDY — JOHNSON CONTROLS, INC.

### JOHNSON CONTROLS ENERGY & WASTE MANAGEMENT OUTSOURCING SOLUTIONS

Energy and waste management are familiar themes for Johnson Controls, where its Controls Group provides outsourcing solutions for non-residential facilities including commercial companies, military bases, and government agencies. The services typically include multiple aspects of facility operation and maintenance, and may also include receiving and tracking hazardous materials, energy optimization, and recycling of paper, solid waste, and sludge. Shared savings agreements or other performance incentives are sometimes included for a particular service, especially if energy management is part of the contract. For its clients, Johnson Controls has performed ergonomic studies, provided safety training, and furnished on-site safety experts staff to oversee safety performance of subcontractors. In fact, the company uses its expertise in contract management to obtain and supervise contractors for whatever needs its clients may want to delegate.

Johnson Controls often supports customers with energy management solutions. For example, Johnson Controls partnered with MetLife to prevent unscheduled downtime and expensive peak loads at a computer facility near Albany, NY where MetLife has consolidated its \$1.6 trillion of life insurance into one comprehensive database. Here, any disruption of the data center paralyzes MetLife's workforce and costs the company thousands of dollars per minute. The customer selected a Metasys® Building Automation System to integrate and regulate mechanical, electrical, lightning, and fire systems, including 6,028 system points and over 1,000 pieces of equipment. The Metasys system ensures that the center's four mainframe processors are water-cooled, automatically activating a back-up chiller if either of the two front-line chillers fail, while simultaneously monitoring electrical power to avoid costly peaks in demand. To complement the Metasys control system, MetLife signed a three year Integrated Facility Management contract to provide preventive and predictive maintenance for all mechanical equipment. Johnson Controls provides six on-site employees and system coverage seven days a week, 24 hours a day. In addition to increased reliability, Metlife results include lower labor and energy costs, better maintenance, and longer equipment lifetime.

Johnson Controls is the market leader in energy management services. By 2010, the cumulative lifetime savings from the 1,400 energy efficiency projects implemented by Johnson Controls through 1998 will produce approximately \$18 billion in energy savings, reduce electric demand by 3,425 megawatts, and reduce carbon dioxide emissions as much as removing four million gas-combustion motor vehicles from the environment or planting 29 million acres of trees.<sup>20</sup> One example of these energy reductions is an on-going Energy Savings Performance Contract for the Department of Energy Hanford Complex. Here Johnson Controls upgraded a distributed steam heating system, absorbing most of the risk by financing the project with an agreed payback schedule based on actual cost savings. The new system switched to fuel with lower carbon content, reduced ground losses and discharges, installed integrated controls, and also extended natural gas pipelines to the nearby community. The project reduced energy consumption by 40%, water losses by 85%, sulfur oxide emissions by 93%, and NOx emissions by 60%. It will net savings of \$108 million over the life of the contract. The Hanford project received Federal Energy and Water Management Awards for outstanding contributions to energy conservation and environmental protection. ■

## SUMMARY FOR TOPIC FIVE

To better focus on their core competencies, cut costs, and simultaneously improve their EHS performance, many companies have outsourced to expert subcontractors aspects of their operation with potentially serious EHS impacts. Examples include managing chemicals, hazardous waste, and energy.

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(20) Calculations by the nonprofit Leonardo Academy, in recognizing Johnson Controls for having a major environmental and economic impact through energy efficiency efforts. Results excerpted from the Academy's *A Cleaner and Greener Program Report, 1998*.

# APPENDIX ONE

## HOW BUSINESS VALUE DEPENDS UPON YOU

Many different departments and professions have a role to play in optimizing supply chain performance. These roles are summarized in the table on the next page. The importance of integration across departmental lines cannot be over-emphasized. Otherwise design, purchasing, logistics, and operations will each strive to maximize performance from their own perspective, creating a sub-optimal result for the entire firm and supply chain. It is the integration of chemicals management across the entire supply chain that allows for the substantial savings discussed in Topic Five. A proactive, integrated approach to procurement that includes participation in design decisions can typically deliver at least 10% savings in hard costs and greater improvements in profitability.<sup>21</sup>

Quality was once seen as an end-of-line job for the quality department, just as environment is often seen as end-of-pipe management of by-products. However, it is now generally accepted that quality should be pursued by design and with interdepartmental teams, and that high quality is in fact the best means to lower costs and boost profits. A similar shift is occurring for environment, health, and safety, which are increasingly important components of quality and cost. Pollution prevention and design for environment are integrative approaches compatible with designing out defects.

The table on page 60 is a summary of the roles played by different kinds of individuals within the company. If you understand the perspective and potential contribution of other departments, you will be more effective in gaining their collaboration in efforts to improve the business and EHS performance of the supply chain.

(21) David Burt, Richard Pinkerton, *A Purchasing Manager's Guide to Strategic Proactive Procurement*, American Management Association, New York, 1996, pgs 1-10.

Business Role	Core Contribution to Business Value	Key Drivers/ Performance Measures	Roles in Supply Chain EHS Initiatives	Tips for Supporting Supply Chain EHS Initiatives
Upper Management	Set strategic direction	Market share Profitability	Make a strong, consistent commitment to EHS excellence.	Put the company's EHS commitments in writing, and monitor the company's EHS performance.
(CFO, CEO, Board of Directors)	Establish corporate culture Maintain and shape the public image of the company	Shareholder value Employee satisfaction	Support efforts to improve EHS performance of the supply chain. Support effective use of cross-functional teams. Review results of supply chain initiatives and provide feedback. Reward managers for success in improving the EHS performance of suppliers and inputs.	Put the company's EHS commitments in writing, and monitor the company's EHS performance. Directly contact critical suppliers to communicate expectations. Provide steady long-term support for initiatives to improve supply chain performance; avoid high profile short-term initiatives likely to be perceived as the "program du jour".
Marketing	Understand who the customers are – what they want, what they respond to, what they buy. Target advertising to customers Identify new product/ service opportunities	Market share Total sales How much product is moved based on promotion	Understand and convey your customers' interest in EHS performance. Which EHS issues or impacts are important to them? Identify opportunities to enhance sales by emphasizing or improving EHS performance of your company and its products or services.	Educate customers on the EHS issues relevant to your business and how your company has responded. Educate customers on any EHS-related benefits of products or services your company provides. Provide customer service representatives with information to respond to EHS-related inquiries.
Operations Managers	Make products/ deliver services Ensure continuity of operations Maximize internal efficiency and safety of production process Maintain quality of product/service	Cost of operations Resource utilization (Including energy use, employee productivity) Quality of product (rejection rates) Accident rates	Help identify EHS-related problems contributing to risks and costs. Assess the potential impacts of any changes to ingredients or process. Help line employees understand and integrate EHS objectives in their work. Assist in conducting training seminars for suppliers.	Make sure that teams working to improve EHS performance understand technical constraints and other operating requirements, so that their proposals will be practical. Provide operations engineers to work closely with suppliers. Be alert to lessons that may be learned from suppliers regarding possible improvements.
EHS Professionals	Identify and reduce regulatory burdens Interpret/translate external requirements Avoid litigation Reduce waste through recycling and reuse of materials	Departmental costs Regulatory violations and fines Safety rates (accident rates and lost work days) Energy usage Waste cost and burdens	Obtain critical commitments from management. Offer advice and support to the suppliers' EHS professionals. Work closely with suppliers to develop solutions to EHS problems. Provide information to procurement department regarding EHS aspects, goals and objectives.	Use life cycle concepts and environmental cost accounting techniques to show the true costs of your company's current inputs and processes. Help procurement staff factor eventual EHS-related costs into purchase decisions that look beyond price to best "total value". Work with procurement to identify or develop suppliers who meet EHS standards.
Procurement Managers	Negotiate with suppliers for lower prices, higher quality Assure a reliable source for inputs Maintain quality standards for inputs Develop and maintain relationships with suppliers Bring innovation and new technology into the corporation	Price Quality Service Innovation Continuity (Incumbency/ Non-incumbency) Litigation avoidance due to strong contact negotiation	Facilitate collaborative relationships with suppliers. Involve EHS staff at key points in contract negotiations, supplier assessment, site visits. Incorporate EHS requirements as standard parts of contract documents.	Understand the supplier's ability to make desirable EHS-related improvements. Create, understand, and convey to suppliers ways that improved EHS performance will benefit them as well as your company. Integrate new EHS-related requirements of suppliers in existing assessment tools and processes whenever possible. Do not ask of suppliers information you will not use to make assessments. Reinforce your EHS initiative or requirements in all communications to suppliers.

# APPENDIX TWO

## RECOMMENDED RESOURCES

*The following resources are recommended to procurement and EHS staff to stimulate their mutual understanding and better management of EHS impacts in the supply chain.*

Bierma, Thomas J. and Frank L. Waterstraat. *Innovative Chemical Supply Contracts: A Source of Competitive Advantage (TR-31)*. Illinois Department of Natural Resources, September 1997.

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Business for Social Responsibility Education Fund. *Green Marketing: Risk or Opportunity. A brief report on different approaches to marketing corporate environmental efforts*. San Francisco: Business for Social Responsibility, October 1999.

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Krut, Riva and Leslie Karasin. *Supply Chain Environmental Management: Lessons from Leaders in the Electronics Industry*. Eds. Robert E. Fishbein and Suzanne Young. U.S. Agency for International Development, Clean Technology and Environmental Management (CTEM) and Benchmark Environmental Consulting, October 1999.

Lippman, Steve. "Supply Chain Environmental Management: Elements for Success." *Corporate Environmental Strategy*. Vol. 0, No. 0, Spring 1999.

Lober, Douglas J. and Mark D. Eisen. "The Greening of Retailing: Certification and the Home Improvement Industry." *Journal of Forestry*. Vol. 93, No.4, April 1995. pps. 38-41.

Lyons, Ken. *Buying for the Future: Contract Management and the Environmental Challenge*. Sterling, Virginia: Pluto Press, 2000.

McIntyre, Kristie, Hugh A. Smith, Alex Henham and John Pretlove. "Logistics Performance Measurement and Greening Supply Chains: Diverging Mindsets." *The International Journal of Logistics*. Vol. 9, No. 1. pps. 57-67.

Milligan, Brian. "Manufacturing Looks to Outsource Chemical Management." *Purchasing Magazine*. 4 November 1999.

Russel, Trevor, ed. *Greener Purchasing: Opportunities and Innovations*. Greenleaf Publishing, 1998.

*Tools for Optimizing Chemical Management Manual: Strategies for Reducing Chemical Use and Cost* San Francisco: The Chemical Strategies Partnership, 1999.

U.S. Environmental Protection Agency. ClimateWise Program. "Supply Side Economics: How General Motors Cuts Costs by Making Its Suppliers Leaner and Cleaner." *Climate Wisdom*. Washington, D.C.: U.S. Environmental Protection Agency, Spring 1998.

U.S. Environmental Protection Agency. Office of Pollution Prevention and Toxics. Environmentally Preferable Purchasing Program. *Private Sector Pioneers: How Companies are Incorporating Environmentally Preferable Purchasing*. Washington: U.S. Environmental Protection Agency, June 1999.

Walton, Steve V., Robert B. Handfield, and Steven A. Melnyk. "The Green Supply Chain: Integrating Suppliers into Environmental Management Processes." *International Journal of Purchasing and Materials Management*. Spring 1998. pps. 2-9.

# APPENDIX THREE

## GLOSSARY OF EHS TERMS

*This listing of U.S. Laws and other terms was compiled for procurement staff to help them understand the vocabulary and world view of EHS staff.*

### U.S. Environmental, Health and Safety Laws

#### **The Clean Air Act (CAA)**

42 U.S.C. §7401 et seq. (1970)

The Clean Air Act is the comprehensive Federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes the U.S. Environmental Protection Agency to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

The goal of the Act was to set and achieve NAAQS in every state by 1975. The setting of maximum pollutant standards was coupled with directing the states to develop state implementation plans (SIPs) applicable to appropriate industrial sources in the state.

The Act was amended in 1977 primarily to set new goals (dates) for achieving attainment of NAAQS since many areas of the country had failed to meet the deadlines. The 1990 amendments to the Clean Air Act in large part were intended to meet unaddressed or insufficiently addressed problems such as acid rain, ground-level ozone, stratospheric ozone depletion, and air toxics.

#### **The Clean Water Act (CWA)**

33 U.S.C. §121 et seq. (1977)

The Clean Water Act is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States.

The law gave EPA the authority to set effluent standards on an industry basis (technology-based) and continued the requirements to set water quality standards for all contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit National Pollution Discharge Elimination System (NPDES) is obtained under the Act.

The 1977 amendments focused on toxic pollutants. In 1987, the CWA was reauthorized and again focused on toxic substances, authorized citizen suit provisions, and funded sewage treatment plants (POTWs) under the Construction Grants Program.

The CWA provisions for the delegation by EPA of many permitting, administrative, and enforcement aspects of the law to state governments. In states with the authority to implement CWA programs, EPA still retains oversight responsibilities.

#### **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**

42 U.S.C. §9601 et seq. (1980)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. Over five years, \$1.6 billion was collected and the tax went to a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites.

CERCLA:

- Established prohibitions and requirements concerning closed and abandoned hazardous waste sites;
- Provided for liability of persons responsible for releases of hazardous waste at these sites; and
- Established a trust fund to provide for cleanup when no responsible party could be identified.



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The law authorizes two kinds of response actions:

- Short-term removals where actions may be taken to address releases or threatened releases requiring prompt response.
- Long-term remedial response actions that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on EPA's National Priorities List (NPL).

CERCLA also enabled the revision of the National Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also established the NPL.

CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) on October 17, 1986. SARA:

- Stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites;
- Required Superfund actions to consider the standards and requirements found in other State and Federal environmental laws and regulations;
- Provided new enforcement authorities and settlement tools;
- Increased State involvement in every phase of the Superfund program;
- Increased the focus on human health problems posed by hazardous waste sites;
- Encouraged greater citizen participation in making decisions on how sites should be cleaned up; and
- Increased the size of the trust fund to \$8.5 billion.

SARA also required EPA to revise the Hazard Ranking System (HRS) to ensure that it accurately assessed the relative degree of risk to human health and the environment posed by uncontrolled hazardous waste sites that may be placed on the National Priorities List (NPL).

**The Emergency Planning & Community Right-To-Know Act (EPCRA) or Title III**  
42 U.S.C. §11011 et seq. (1986)

Also known as Title III of SARA, EPCRA was enacted by Congress as the national legislation on community safety. This law was designated to help local communities protect public health, safety, and the environment from chemical hazards.

To implement EPCRA, Congress required each state to appoint a State Emergency Response Commission (SERC). The SERC's were required to divide their states into Emergency Planning Districts and to name a Local Emergency Planning Committee (LEPC) for each district.

Broad representation by fire fighters, health officials, government and media representatives, community groups, industrial facilities, and emergency managers ensures that all necessary elements of the planning process are represented.

**The Endangered Species Act (ESA)**

7 U.S.C. §136; 16 U.S.C. §460 et seq. (1973)

The Endangered Species Act provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The U.S. Fish and Wildlife Service (FWS), of the Department of the Interior maintains the list of 632 endangered species (326 are plants) and 190 threatened species (78 are plants).

Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. Anyone can petition FWS to include a species on this list. The law prohibits any action, administrative or real, that results in a "taking" of a listed species, or adversely affects habitat. Likewise, import, export, interstate, and foreign commerce of listed species are all prohibited.

EPA's decision to register a pesticide is based in part on the risk of adverse effects on endangered species as well as environmental fate (how a pesticide will affect habitat). Under FIFRA, EPA can issue emergency suspensions of certain pesticides to cancel or restrict their use if an endangered species will be

adversely affected. Under a new program, EPA, FWS, and USDA are distributing hundreds of county bulletins that include habitat maps, pesticide use eliminations, and other actions required to protect listed species.

**Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)**

7 U.S.C. §135 et seq. (1972)

The primary focus of FIFRA was to provide federal control of pesticide distribution, sale, and use. EPA was given authority under FIFRA not only to study the consequences of pesticide usage but also to require users (farmers, utility companies, and others) to register when purchasing pesticides.

Through later amendments to the law, users also must take exams for certification as applicators of pesticides. All pesticides used in the U.S. must be registered (licensed) by EPA. Registration assures that pesticides will be properly labeled and that if in accordance with specifications, will not cause unreasonable harm to the environment.

**Food Quality Protection Act (FQPA)**

Public Law 104-170, Aug. 3, 1996

The Food Quality Protection Act (FQPA) of 1996 amended the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food Drug, and Cosmetic Act (FDCA). These amendments fundamentally changed the way EPA regulates pesticides. The requirements included a new safety standard – reasonable certainty of no harm – that must be applied to all pesticides used on foods.

**National Environmental Policy Act of 1969 (NEPA)**

42 U.S.C. §4321-4347

NEPA is the basic national charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy.

It was one of the first laws ever written that establishes the broad national framework for protecting our environment. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment.

NEPA requirements are invoked when airports, buildings, military complexes, highways, parkland purchases, and other federal activities are proposed. Environmental Assessments (EA) and Environmental Impact Statements (EIS), which are assessments of the likelihood of impacts from alternative courses of action, are required from all Federal agencies and are the most visible NEPA requirements.

**The Occupational Safety and Health Act (OSHA)**

29 U.S.C. §651 et seq. (1970)

Congress passed the Occupational Safety and Health Act to ensure worker and workplace safety. Their goal was to make sure employers provide their workers a place of employment free from recognized hazards to safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions.

In order to establish standards for workplace health and safety, the Act also created the National Institute for Occupational Safety and Health (NIOSH) as the research institution for the Occupational Safety and Health Administration (OSHA). OSHA is a division of the U.S. Department of Labor that oversees the administration of the Act and enforces standards in all 50 states.

**The Oil Pollution Act of 1990 (OPA)**

33 U.S.C. §2702 to 2761

The Oil Pollution Act (OPA) of 1990 streamlined and strengthened EPA's ability to prevent and respond to catastrophic oil spills. A trust fund financed by a tax on oil is available to clean up spills when the responsible party is incapable or unwilling to do so. The OPA requires oil storage facilities and vessels to submit to the Federal government plans detailing how they will respond to large discharges. EPA has published regulations for aboveground storage facilities; the Coast Guard has done so for oil tankers. The OPA also requires the development of Area Contingency Plans to prepare and plan for oil spill response on a regional scale.

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#### **The Pollution Prevention Act (PPA)**

42 U.S.C. §13101 and 13102, § et seq. (1990)

The Pollution Prevention Act focused industry, government, and public attention on reducing the amount of pollution through cost-effective changes in production, operation, and raw materials use. Opportunities for source reduction are often not realized because of existing regulations, and the industrial resources required for compliance focus on treatment and disposal. Source reduction is fundamentally different and more desirable than waste management or pollution control.

Pollution prevention also includes other practices that increase efficiency in the use of energy, water, or other natural resources, and protect our resource base through conservation. Practices include recycling, source reduction, and sustainable agriculture.

#### **The Resource Conservation and Recovery Act (RCRA)**

42 U.S.C. §321 et seq. (1976)

RCRA (pronounced "rick-rah") gave EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous wastes.

The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future facilities and does not address abandoned or historical sites (see CERCLA).

The Federal Hazardous and Solid Waste Amendments (HSWA, pronounced "hiss-wa") are the 1984 amendments to RCRA that required phasing out land disposal of hazardous waste. Some of the other mandates of this strict law include increased enforcement authority for EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program.

#### **The Safe Drinking Water Act (SDWA)**

42 U.S.C. §300(f) et seq. (1974)

The Safe Drinking Water Act was established to protect the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designed for drinking use, whether from above ground or underground sources.

The Act authorized EPA to establish safe standards of purity and required all owners or operators of public water systems to comply with primary (health-related) standards. State governments, which assume this power from EPA, also encourage attainment of secondary standards (nuisance-related).

#### **The Toxic Substances Control Act (TSCA)**

15 U.S.C. §2601 et seq. (1976)

The Toxic Substances Control Act (TSCA) of 1976 was enacted by Congress to give EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States. EPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard. EPA can ban the manufacture and import of those chemicals that pose an unreasonable risk.

Also, EPA has mechanisms in place to track the thousands of new chemicals that industry develops each year with either unknown or dangerous characteristics. EPA then can control these chemicals as necessary to protect human health and the environment. TSCA supplements other Federal statutes, including the Clean Air Act and the Toxic Release Inventory under EPCRA.

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## Environmental, Health and Safety Acronyms and Terms

### ACC (American Chemistry Council)

Formerly known as the Chemical Manufacturers' Association (CMA).

### BST (Behavioral Safety Techniques)

A safety management approach that seeks to proactively manage safety by focusing on human behavior, and identifying and removing barriers to continuous improvement. This approach is designed to avoid managing safety by simply reacting to fluctuating incident rates.

### CERES (Coalition for Environmentally Responsible Companies)

A non-profit coalition of investor, public pension funds, foundations, labor unions, and environmental, religious and public interest groups, working in partnership with companies toward the common goal of corporate environmental responsibility worldwide.

### CERES Principles

A set of 10 broad principles, created by CERES, designed to establish an environmental ethic with criteria by which investors and others can assess the environmental performance of companies. The principles cover the following areas: protection of the biosphere, sustainable use of natural resources, waste reduction/disposal, energy conservation, risk reduction, safe products and services, environmental restoration, informing the public, management commitment, and audits/reports. Companies which commit to the principles commit to publishing an annual audit of their progress in abiding by the principles.

### Climate Change

Refers to a long-term change in weather patterns. In some cases, "climate change" has been used synonymously with the term, "global warming"; scientists however, tend to use the term in the wider sense to also include natural changes in climate.

### CMA (Chemical Manufacturers Association)

Now known as the American Chemistry Council (ACC).

### Continuous Improvement

Process of enhancing the environmental management system to continually achieve improvements in overall environmental performance.

### DfE

Design for the Environment.

### EHS

Environmental, health, and safety.

### EMIS

Environmental management information system.

### EMS (Environmental Management System)

Organizational structure, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining the environmental policy

### Environmental Performance

The measurable results of the environmental management system, related to an organization's control of its environmental aspects, based on its environmental policy, objectives, and targets.

### Environmental Policy

Statement by the Organization of its intentions and principles in relation to its overall environmental performance, which provides a framework for action and for the setting of its Environmental Objectives and Targets.

### Environmental Target

Detailed performance requirement, quantified wherever practicable, applicable to the organization or parts thereof, that arise from the environmental Objectives and that needs to be set and met in order to achieve those Objectives. Example: reduce water usage by 10% or achieve Environmental Status 3.

### Environmental Aspects

Element of an organization's activities, products and services that can interact with the environment. Examples: Water Consumption, release of toxins to the air.

### Environmental Impact

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products, or services

### Ergonomics

The applied science of designing equipment and tools to maximize worker productivity, reduce fatigue or discomfort, and prevent health and safety problems. Also called also human engineering.

### Greenhouse Gases

Any gas that absorbs infra-red radiation in the atmosphere. Greenhouse gases include water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), halogenated fluorocarbons (HCFCs), ozone (O<sub>3</sub>), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs). (Source: EPA)

### Hazardous Material / Substance

Any chemical or item that is capable of posing an unreasonable risk to health, safety or property when used, stored or transported. Specific or general chemical groups, (e.g., Corrosive, Flammable, Oxidizers and Poisons) are usually defined by regulatory agencies.

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**ISO 14001**

An international standard for Environmental Management Systems focused on characteristics of the management system itself, not upon specific environmental impacts. Registered ISO 14001 auditors can provide certification for facilities and firms.

**LCA**

Life Cycle Assessment.

**LCM**

Life Cycle Management.

**MSDS (Material Safety Data Sheet)**

A chemical fact sheet meeting the minimum requirements of the U.S. Occupational Safety and Health Administration's Hazard Communication requirements. It may be used to identify proper health and safety guidelines and proper handling and disposal of a wide range of hazardous, toxic or regulated materials.

**NAAQS**

National Ambient Air Quality Standards.

**NESHAP**

National Emission Standard for Hazardous Air Pollutants.

**NSPS**

New Source Performance Standards.

**P2 (Pollution Prevention)**

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 materials substitution.

**PCSD (President's Council on Sustainable Development)**

Established by President Clinton in June 1993 to advise him on sustainable development and develop "bold, new approaches to achieve our economic, environmental, and equity goals." The mission of the PCSD includes:

- Forge consensus on Policy by bringing together diverse interests to identify and develop innovative economic, environmental and social policies and strategies;
- Demonstrate Implementation of policy that fosters sustainable development by working with diverse interests to identify and demonstrate implementation of sustainable development;
- Get the word out about sustainable development; and
- Evaluate and report on progress by recommending national, community, and enterprise level frameworks for tracking sustainable development.

**PRP**

Potentially Responsible Party.

**SARA (Superfund Amendments and Reauthorization Act)**

See discussion of CERCLA on page 62.

**Sustainable Design**

Designing products that can be made, used, and retired from use without degrading the environment.

**Sustainable Development**

There are many definitions of sustainable development. Most stem from the one developed by the United Nations World Commission on Environment and Development: "Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs."

**TRI (Toxic Release Inventory)**

A publically accessible database, developed and maintained by the EPA, that contains information concerning waste management activities and the release of 650 specific toxic chemicals by facilities that manufacture, process, or otherwise use those chemicals. Using this information, citizens, businesses, and governments can work together to protect the quality of their land, air and water. For example, many emergency management agencies, fire departments, and emergency medical services use TRI to identify chemicals in use and map facility layouts for more effective, quicker response to emergencies. TRI is mandated by two rules, Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) and section 6607 of the Pollution Prevention Act (PPA).

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