An Environmental Management System (EMS) Primer for Ports:

Advancing Port Sustainability

SectorStrategies

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U.S. Environmental Protection Agency

An Environmental Management System Primer for Ports: Advancing Port Sustainability

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List of Acronyms

AAPA	American Association of Port Authorities
BMP	Best management practice
C&M	Construction & maintenance
CAA	Clean Air Act
CEO	Chief executive officer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIF	Continual Improvement Form
CFT	Cross-functional team
COO	Chief operating officer
COOP	Continuity of operations
CWA	Clean Water Act
DVD	Digital versatile disc or digital video disc
EA	Environmental aspect
EBIT	Earnings before interest & taxes
EH&S	Environmental, health, and safety
EI	Environmental impact
EMP	Environmental management plan
EMR	Environmental management representative
EMS	Environmental management system
EO	Executive order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning & Community Right-to-Know Act
EP&R	Emergency preparedness and response
FEMA	Federal Emergency Management Agency
FRP	Federal Response Plan
FSP	Facility security plan
GETF	Global Environment & Technology Foundation
GHG	Greenhouse gas
GRI	Global Reporting Initiative
ha	hectare
HMTA	Hazardous Materials Transportation Act
HNE	Harbors, Navigation, and Environment [AAPA Sustainability Working Group]
HVAC	Heating, ventilating, and air conditioning
ICP	Integrated Contingency Plan
ILO	International Labour Organization
ISO	International Organization for Standardization
ISPS	International Ship and Port Security
JRRF	James River Reserve Fleet
LEED	Leadership in Energy and Environmental Design
MARAD	Maritime Administration
MARSEC	Maritime Security
MFM	Marine Facility Management
MOA	Memorandum of agreement
MTSA	Maritime Transportation Security Act
NIT	Norfolk International Terminals
NOV	Notice of violation
NOx	Nitrogen oxides
NRAMP	Natural resources assessment and implementation plan
PAS	Publicly available specification
PDX	Portland International Airport
PM	particulate matter
RCRA	Resource Conservation & Recovery Act

List of Acronyms

SAFE	Security and Accountability for Every [Port Act of 2006]
SEA	Significant environmental aspect
SMS	Security management system
SOLAS	Safety of Life at Sea
SOP	Standard operating procedure
SPCC	Spill Prevention, Control and Countermeasure
3Es	Economic, environmental, and social (equity)
3Ps	Profit/prosperity, planet, and people
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USGC	U.S. Coast Guard
VIT	Virginia International Terminals
V-REMS	Virginia Regional Environmental Management System
VPA	Virginia Port Authority

Introduction

Waterborne commerce is increasing rapidly and presenting ports with challenges that could not have been imagined even two decades ago. By 2020, the total volume of cargo shipped by water is expected to be double that of 2001 volumes.[1] At the same time, lifestyle changes have made the cruise industry the fastest growing segment of the travel industry – achieving more than 2,100 percent growth since 1970.[2]

To accommodate increases in trade volume, increases in the size of cargo and cruise ships, and new security requirements, many U.S. ports are investing billions of dollars in infrastructure improvements such as deeper channels, larger cranes, and other facility and property enhancements. While many of these investments facilitate improvements in the operational efficiency of existing port operations, many ports also need to physically expand to meet business demands. Even the ports that have traditionally viewed themselves as environmental stewards of coastal resources are finding it challenging to balance economic, environmental, and social issues, i.e., to grow sustainably.

To ensure that this growth is executed responsibly, many ports have proactively addressed their environmental and related socio-economic responsibilities through the development of Environmental Management Systems (EMSs). The purpose of this primer is to help ports develop EMSs and understand how an EMS can advance port sustainability.

Overview of EMSs

An EMS is a formal system for proactively managing the environmental footprint of a port. It incorporates environmental considerations and decision making into a port's day-to-day operations and into its strategic planning. Additionally, an EMS provides a structured framework designed to achieve continual environmental improvement beyond regulatory compliance. An EMS can help ports to improve efficiency, reduce costs, and minimize negative impacts on human health and the environment.

Over the last several years, the U.S. Environmental Protection Agency (EPA) has been involved in a wide range of voluntary activities to facilitate adoption of EMSs, including the Sector Strategies Program, which promotes the use of EMSs at ports as well as a dozen other economic sectors nationwide.[3] EPA also has EMSs at its own facilities and assists other government agencies in developing theirs.[4]

While each EMS is unique to an organization's culture and priority issues, most follow the Plan-Do-Check-Act model. This model establishes a framework to examine and prioritize the environmental aspects of an organization, then develop, implement, monitor, review, and revise environmental programs and procedures to

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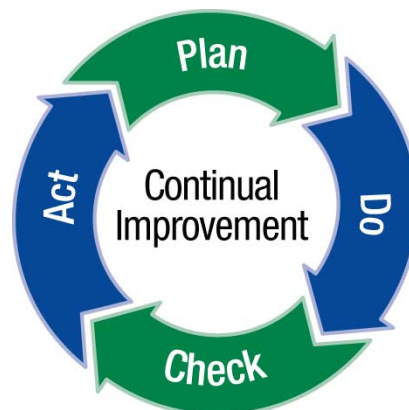
[1] See www.aapa-ports.org/Industry/content.cfm?ItemNumber=1022&navItemNumber=901, accessed March 30, 2007.

[2] See www.cruising.org/press/sourcebook2006-midyear/profile_cruise_industry.cfm, accessed March 30, 2007.

[3] See www.epa.gov/sectors/ports/index.html for information on port participation in EPA's Sector Strategies Program.

[4] On October 16, 2006, EPA restated its commitment to integrating and utilizing EMS at its own facilities nationwide; see "Commitment to the Integration and Utilization of Environmental Management Systems," a copy of which is available at: www.peercenter.net/ewebeditpro/items/O73F9817.pdf, accessed March 30, 2007. For more information on EPA's progress in implementing EMSs at its laboratories and offices nationwide, please visit: http://www.epa.gov/ems/epaown/index.htm. One way that EPA assists other federal agencies develop EMSs is by providing information through the Fedcenter website (http://www..fedcenter.gov), which helps federal agencies better address their environmental needs.

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continually promote sound day-to-day management and improvement. Many ports already have components of an EMS in place, such as written and unwritten procedures, best management practices (BMPs), and regulatory compliance programs. An EMS naturally leverages and builds upon existing good practices and the practical knowledge base of employees throughout the organization.

U.S. ports with an EMS in place include:

- Massachusetts Port Authority (Massport), Port of Boston;[5]
- Port Authority of New York and New Jersey;
- Port of Corpus Christi Authority, TX;
- Port of Houston Authority, TX;
- Port of Los Angeles, CA;
- Port of Portland, OR;
- Port of Seattle, WA;
- Port of Vancouver, WA; and
- Virginia Port Authority.

> "We see the EMS as a valuable tool to help us meet the environmental challenges facing our port." — Ralph G. Appy, Ph.D., Director of Environmental Management, Port of Los Angeles
>
> Source: EPA, AAPA, & GETF. *Environmental Management Systems: Systematically Improving your Performance: Ports Sector*, September 2004.

Domestic ports developing an EMS include:

- Maryland Port Administration, Port of Baltimore;
- Port Everglades, FL;
- Port of Cleveland, OH;
- Port of Everett, WA;
- Port of Freeport, TX;
- Port of Long Beach, CA;
- Port of New Orleans, LA; and
- Port of Oakland, CA.

These and other ports worldwide have found important benefits from developing EMSs:

- Improved environmental awareness, compliance, and performance;
- Reduced costs and improved operational efficiency through more efficient use of materials, operational streamlining, and strategic direction setting;
- Reduced risk and liability, and improved security and emergency response capability;
- Improved internal communication and cooperation, including those between port authorities and terminal operators; and
- Enhanced credibility, public image, and public confidence, as ports monitor and report performance and position themselves as leaders in environmental protection and management.

> **Common Principles of Sustainability**
>
> - Dealing transparently & systemically with risk, uncertainty, & irreversibility
> - Ensuring appropriate valuation, appreciation, & restoration of nature
> - Integration of environmental, social, human, & economic goals in policies & activities
> - Equal opportunity & community participation
> - Conservation of biodiversity & ecological integrity
> - Ensuring inter-generational equity
> - Recognizing the global integration of localities
> - A commitment to best practice
> - No net loss of human capital or natural capital
> - The principle of continuous improvement
> - The need for good governance
>
> Source: Hargroves, K. and M. Smith (Eds.) 2005. The Natural Advantage of Nations: Business Opportunities, Innovation and Governance in the 21st Century. Earthscan/James&James.

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[5] Massport has also developed an EMS for its airport facilities.

How an EMS Advances Port Sustainability

In addition to environmental compliance requirements, ports continue to face daunting challenges in this time of significant growth. Among other realities, heightened community concern about port expansion plans, the magnitude of anticipated resource and capital investments, and rising costs of energy resources and management of waste byproducts have left many ports looking for an all-inclusive, systems-based, management approach to operations. Increasingly, ports are looking holistically at their overall business practices with a view toward "sustainability."

Since first introduced in the mid-1970s, the concept of sustainability as a business concern has evolved to equate to the "Triple Bottom Line" or "sustainability trinity," i.e., an organization's performance in three areas:

- 3Es – Economic, Environmental, and social (Equity); or
- 3Ps – Profit/Prosperity, Planet, and People.[6]

The Global Reporting Initiative (GRI), for example, has developed a 3E framework for sustainability reporting that is now used by nearly 1,000 organizations from over 60 countries.[7] Acknowledging lessons learned from the GRI efforts and other sustainability initiatives, the American Association of Port Authorities (AAPA) is also working to develop and implement a sustainability framework for its members. AAPA represents the 80+ largest public ports in the United States and is a partner in EPA's Sector Strategies Program.

Sustainable Ports Keep Things Moving

A key tenet of sustainability is that it is not limited to environmental stewardship. Rather, sustainability focuses on understanding the interconnections among the economy, society, and environment, and the equitable distribution of resources and opportunities – both now and in the future. Sustainable ports look at their operations in an all-inclusive manner, enhancing their profitability while existing responsibly within the larger community. They are able to meet today's global economic, environmental, and social needs without compromising the ability of future generations to meet theirs.

Ports are beginning to define broader sustainability policies that extend beyond environment stewardship. The Port of New York and New Jersey has developed the following Triple Bottom Line statement:

> Success won't be measured by simple market-based metrics like cargo volume or market share alone. In fact, as it serves its maritime customers, the Port of New York and New Jersey must also meet a Triple Bottom Line. It must be: 1) an engine of regional prosperity; 2) secure and environmentally sustainable; and 3) financially self-sustaining. Those are key components of the region's quality of life – and that is the benchmark of success for the bi-state Port.[8]

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[6] In its 1987 Report, *Our Common Future*, the United Nations-convened Brundtland Commission dealt with sustainable development, which it defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." See www.ringofpeace.org/environment/brundtland.html for an easy-to-read version of the Brundtland Report; accessed April 2, 2007.

[7] See http://www.globalreporting.org/ReportingFramework/ for additional information on GRI's Reporting Framework.

[8] Statement provided by Joseph Monaco, March 8, 2007, email to AAPA's Harbors, Navigation, and Environment (HNE) Sustainability Working Group.

Other ports, including the Port of Oakland, also define sustainability in terms of the "3E trinity" of economic, environmental, and social equity.

These and other examples suggest that ports worldwide are working toward and committed to sustainability, with promising potential and possibilities.

Clearly, senior management support and leadership are crucial – both for an EMS and its environmental stewardship activities, and for broader sustainability principles and practices. The decision to implement an EMS entails a commitment of time and monetary resources. On average, it takes a year to set up an EMS, although individual systems can vary from three months to two years depending on project scope (i.e., its "fenceline") and resources.[9] Senior management plays an active role in the EMS, continually assessing the organization's progress toward its goals, looking for ways to improve management and performance, effectively allocating resources and personnel, and sustaining commitment to the system through annual reviews and revisions. Costs vary, but ports that have implemented an EMS have found they are able to recover their upfront costs quickly through early identification of pollution prevention initiatives, potential liabilities, and opportunities to reduce risks.[10]

Elements in Developing an EMS

Within the Plan-Do-Check-Act approach, there are a number of elements that comprise an EMS. The most commonly used framework for an EMS is the one developed by the International Organization for Standardization for its ISO 14001 Standard. For ease of presentation, several ISO elements have been combined in this primer, resulting in a set of 13 elements:

> **Port Sustainability is Worldwide**
>
> "We are committed to sustainable development on port land. Our EMS is central to all decision making regarding environmental performance and sustainability. Simple design solutions help create healthy buildings and promote a sustainable approach to development." — Port of Brisbane, Australia
>
> Source: Port of Brisbane website,
> http://www.portbris.com.au/health/environment/
> environmental_management_systems

1. Define scope of EMS and assign responsibilities;
2. Create environmental policy statement;
3. Identify relevant legal and other requirements;
4. Identify environmental aspects and significant environmental aspects;
5. Establish objectives, targets, and action plans;
6. Develop operational controls;
7. Develop emergency preparedness and response program;
8. Set up a training program for competence and awareness;
9. Create a communications strategy;
10. Set up documentation for the EMS;
11. Monitor, measure, evaluate, and record performance;
12. Conduct audits and correct problems; and
13. Conduct management review.

From Element 1, determining the scope of the effort, to Element 13, performing a management review, there are opportunities for ports to integrate broader sustainability concepts into their EMSs. Ports have

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[9] Conversation with EPA Sector Strategies Program staff, April 2, 2007.

[10] EPA, AAPA & GETF. *Environmental Management Systems: Systematically Improving your Performance: Ports Sector*, September 2004. Also see 1st Ports EMS/SMS Assistance Project, Final Report, May 2006, for information on average resource commitments over a 2-year project period at 11 ports.

begun to plan and implement sustainable, "green port" policies that build on, but extend beyond, their environmental stewardship initiatives. In fact, it can be hard to distinguish between actions resulting from implementation of an EMS and actions taken to improve a port's sustainability. It may be helpful to think of this range of activities on a continuum.

Primer Layout

Efforts by ports to improve their sustainability can be documented and captured within the Plan-Do-Check-Act EMS framework. To help ports understand EMS and sustainability, this primer provides the following information on each EMS element:

- A brief overview of the element in the context of an EMS to provide ports with general EMS concepts;
- One or more real life examples of how ports have implemented the element within their operations; and
- A discussion of how each element can be extended to include facets of broader sustainability.

Many of the examples in this primer come from the 1st Ports Environmental Management Systems/Security Management Systems Assistance Project (January 2004 – December 2005),[11] developed by AAPA in partnership with EPA's Sector Strategies Program and the Global Environment & Technology Foundation (GETF). Through this project, nine ports and two federal maritime facilities worked together over two years to develop EMSs. In addition, the Port of Houston Authority, which had previously developed an EMS, applied the management systems approach to develop a Security Management System (SMS). Following the discussion of EMS elements, this primer provides an overview of how Houston and other ports are using the Plan-Do-Check-Act approach to address security issues through SMSs.

A 2nd Ports EMS/SMS Assistance Project began in February 2006 with four of the seven participating ports developing EMSs and three using the management systems approach to develop SMSs. This 2nd round of EMS/SMS assistance will be completed by March 2008.[12]

Additional examples of ports that are working on EMSs, SMSs, and broader sustainability programs come from AAPA members and from ports located outside the Americas. Information on AAPA's EMS Assistance Projects and its Harbors, Navigation, and Environment Committee can be found at www.aapa-ports.org. To begin developing your port's own customized EMS, refer to numerous online resources, including a list of Technical Assistance Providers, sample documents, and other EMS tools, by visiting www.epa.gov/ems and www.peercenter.net. For more information about the port-related activities of EPA's Sector Strategies Program, visit www.epa.gov/sectors/ports.

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[11] See Final Report, May 2006, at www.peercenter.net/ewebeditpro/items/O73F8587.pdf, accessed March 30, 2007. Contacts at each of the participating ports are listed on p.1 of that publication.

[12] See press release on 2nd round participants at www.peercenter.net/ewebeditpro/items/O73F7760.pdf; accessed March 30, 2007.

Element 1: Define Scope of EMS and Assign Responsibilities

A first step in EMS planning is to establish the "fenceline" by documenting the **scope** of port facilities and activities that the EMS will address. As shown in the accompanying graphic, there are facilities and activities over which a port has direct control. There are other facilities and activities that a port does not directly control but over which it has some influence (e.g., tenant operations).

Finally, there are facilities and activities within a port's zone of interest that could be brought into its zone of influence if the port is proactive (e.g., regional intermodal transportation planning). Most ports start with facilities and operations over which they have direct control; then, they later expand their EMS to address broader areas of influence. When defining the scope of its EMS, a port should also consider practical constraints and timing.
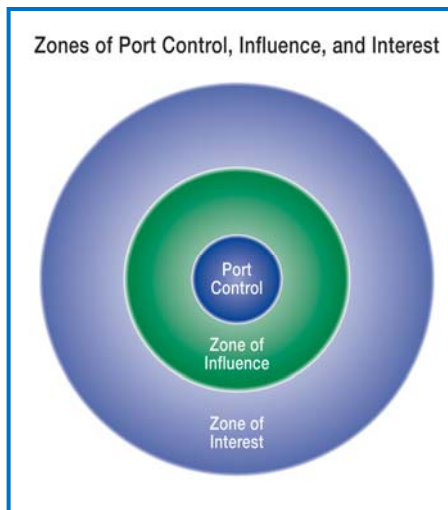
EMS **responsibilities** should be assigned to individuals who can competently complete and fulfill their **roles**. At a minimum, you should describe responsibilities for Core EMS Team members, designate people for these roles, establish lines of **authority**, and create an organization chart for your EMS. Documentation and communication of roles, responsibilities, and authority throughout the port will facilitate effective EMS implementation and management.

Zones of Port Control, Influence, and Interest

Resources are essential for implementation and control of an EMS. They include training, human resources, specialized skills, financial resources, and technical and informational services. Port management must ensure the availability of such resources to the EMS.

> **Typical EMS Core Team Members**
>
> - *Environmental Management Representative (EMR):* Project Manager &/or member of port's top management
> - *EMS Coordinator:* Leads the Team, ensures support for the EMS, & makes sure all EMS tasks are completed
> - *Cross-Functional Team (CFT):* Comprises members who represent each major operation within the port & serve as an information resource; may include risk management, public affairs, operations, human resources, etc.

Element 1 in the Field

Ports have selected their EMS fenceline based on many considerations. For example, the Maritime Administration (MARAD) selected the James River Reserve Fleet (JRRF), a federal anchorage on the James River Fort Eustis Army Transportation Center in Newport News, VA, as the fenceline for its 1st EMS/SMS Assistance Project. MARAD believed that an EMS could enhance its credibility as a federal environmental steward on the James River. Over the last couple of years, National Defense Reserve Fleet ships at JRRF awaiting disposal and/or reefing had been under intense scrutiny by regulatory agencies, including the Virginia Department of Environmental Quality and the U.S. Coast Guard (USCG). A number of ships built in the 1950s, 1960s, and 1970s contained fuel and oil that could pose a threat to the James River ecosystem if an oil spill were to occur. JRRF was chosen as the EMS site because of its diverse environmental consequences, including its position as a tenant at Fort Eustis.[13]

Ports across the country have developed EMS Core Teams that are right-sized for their situations, accessing staff from across operations and divisions within their fencelines.[14]

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[13] Example from the 1st Ports EMS/SMS Assistance Project Final Report, May 2006.

[14] Unless otherwise indicated, these examples are from the 1st Ports EMS/SMS Assistance Project Final Report, May 2006.

- *Port of Virginia:* Because of its size, operational impact on the environment, and public presence, Norfolk International Terminals (NIT), one of four facilities comprising the port, was chosen as the facility for an EMS assistance project. This facility is owned by the Commonwealth of Virginia and operated by Virginia International Terminals (VIT), an operating affiliate of the Virginia Port Authority (VPA). The EMS Core Team included six staff: two members from VPA (Chief Engineer, and Director of Environmental Affairs as EMR) and four members from VIT (Director of Engineering and Maintenance, Facilities Maintenance Supervisor, Vehicle Maintenance Supervisor, and Crane and Straddle Carrier Supervisor).

- *Portland District, U.S. Army Corps of Engineers (USACE):* The Corps' Portland District selected the U.S. Government Moorings shipyard (which includes a number of maintenance facilities and offices for personnel who operate and maintain the ships), two hopper dredges (the *ESSAYONS* and *YAQUINA*), and associated survey and support vessels as the fenceline for its EMS assistance project. The EMS Core Team comprised 11 members: the Environmental Compliance Coordinator as EMR, as well as plant maintenance and dredge operations chiefs, four dredge captains, the shipyard superintendent, two senior port engineers, and the lead hydrographic survey technician.

- *Port of Los Angeles:* The port selected the Construction and Maintenance (C&M) Division as the fenceline for its EMS assistance project. C&M provides maintenance services to all port-owned facilities and consists of offices, equipment storage, and shops for each craftspeople, including electricians, equipment operators, gardeners, painters, laborers, mechanics, machinists, plumbers, roofers, crane mechanics, pile drivers, and carpenters. The EMS Core Team included 25 C&M personnel, 4 representatives from the Environmental Management Division, 1 representative from Public Affairs, and 1 representative from Risk Management.

- *Port of Seattle:* The Port of Seattle is currently piloting an EMS at its Fishermen's Terminal. Wayne Grotheer, Director of Seaport Finance and Asset Management, noted, "We decided to pilot this program at Fishermen's Terminal because it is a microcosm of the larger port. At Fishermen's we have large and small moorage customers, retail, office and industrial tenants and open public access. If a more systematic and formalized approach to managing environmental issues works at Fisherman's Terminal, the port may adopt a similar approach at other facilities." Seattle established an EMS Core Team that includes a cross-section of staff members from its Harbor Services, Health & Safety, Risk Management, and Environmental Divisions.[15]

Enhancements for Sustainability

One way for a port to incorporate sustainability into its EMS is to widen the **scope** of the EMS to include more facilities and activities. Rather than focusing solely on its own operations, a port can include the environmental impacts of all entities over which the port exercises **control** or **significant influence** with regard to financial and operating policies and practices.

- As part of its Green Port Policy,[16] the Port of Long Beach is developing a tiered Sustainability Implementation Plan, which is taking a step-wise approach to defining the port boundary for the purposes of sustainability:

  o First, considering areas that are within the port's direct control;
  o Then, extending to tenants; and
  o Finally, extending to the region in which the port is located.

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[15] Intranet newsletter entitled "New Environmental Program Tests the Waters (And More) At Port Of Seattle's Fishermen's Terminal," Port of Seattle, submitted by Wayne Grotheer to EPA's Sector Strategies Program via email, May 10, 2006.

[16] See www.polb.com/environment/green_port_policy.asp, accessed March 28, 2007.

Long Beach has identified, institutionalized, and budgeted for a Sustainability Practice Manager to coordinate development and implementation of its Sustainability Implementation Plan. This management position cross-cuts port operations.

- The Virginia Port Authority is participating in the Virginia Regional Environmental Management System (V-REMS), a partnership of over 50 federal, state, and local public and private organizations that collaborate to address regional community and environmental issues. Through the V-REMS partnership, participants leverage the collective knowledge and best practices of over 45 public and private organizations that are all working to improve their environmental performance and cost-efficiency. Accordingly, by serving as a crucial resource for information and collaborative opportunities, the V-REMS partnership helps its participants save time and money while they contribute to a cleaner regional environment.[17]

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[17] See http://www.vrems.org/, accessed April 24, 2007.

Element 2: Create Environmental Policy Statement

Once your port has its Core EMS Team trained and in place, the next step is to define, develop, and communicate your facility's environmental policy. As your Team moves forward, the policy will:

- Serve as the foundation for implementing and improving the EMS;
- Provide a unifying vision of environmental commitments and principles that will guide the actions of employees and top management; and
- Demonstrate your port's proactive environmental performance commitments to your workforce, customers, and the public.

Element 2 in the Field

Many ports have developed environmental policy statements to guide their EMS efforts. The following example comes from the Virginia Port Authority's participation in the 1st Ports EMS/SMS Assistance Project;[18] note its references to commonwealth laws and the inclusive nature of its list of port stakeholders.

> **Minimum Port Commitments in EMS Policy Statement**
>
> - Compliance with legal requirements & voluntary commitments
> - Pollution prevention
> - Continuous improvement in environmental performance, including non-regulated areas
> - Communications with your community about the port's environmental performance & the operation of the EMS

> *The Virginia Port Authority and Virginia International Terminals, Inc., are committed to conducting Port operations and managing resources in an environmentally sensitive and sound manner, as prescribed by Article XI, Section 1 of the Constitution of Virginia. It is the intent of each organization to:*
>
> 1. *Meet or exceed all applicable Federal, State, and Local environmental laws and regulations.*
> 2. *Employ management systems and procedures specifically designed to prevent activities and conditions that pose a threat to human health, safety, and the environment through proactive environmental leadership and compliance.*
> 3. *Integrate environmental costs, risks, and impacts into port project development and facility improvements and to continually evaluate and improve operational efficiency and practices to achieve our established environmental and business objectives.*
> 4. *Promote pollution prevention and environmental awareness through communications with employees, customers, tenants, suppliers, contractors, other terminal users, regulatory agencies, neighboring communities and environmental organizations.*
>
> *The Virginia Port Authority and Virginia International Terminals, Inc., are committed to the spirit and intent of this policy and the laws and regulations, which give it foundation.*
>
> *REF: Constitution of Virginia, Effective July 1, 1971 with Amendments – January 1, 2005.*
>
> *Adopted 24 May 2005, Virginia Port Authority, Board of Commissioners*

Massport's environmental policy is available on the Internet; it, too, addresses a broad set of stakeholders and also promotes sustainable design principles:[19]

> *Massachusetts Port Authority (Massport) is committed to operate all of its facilities in an environmentally sound and responsible manner.*

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[18] See Final Report, May 2006.

[19] See www.massport.com/business/pic/c_envmgmt.pdf, accessed March 28, 2007.

Massport will strive to minimize the impact of its operations on the environment through the continuous improvement of its environmental performance and the implementation of pollution prevention measures, both to the extent feasible and practicable in a manner that is consistent with Massport's overall mission and goals. To successfully implement this policy Massport will develop and maintain management systems that will:

- *Ensure that the environmental management policy is available to staff, tenants, customers and the general public.*
- *Ensure compliance with all applicable environmental laws and regulations.*
- *Ensure that environmental considerations are included in business, financial, operational, and programmatic decisions, including feasible and practicable options for potentially exceeding compliance with applicable regulatory requirements.*
- *Define and apply sustainable design principles in the planning, design, operation and decommissioning of its facilities.*
- *Define and establish environmental objectives, targets and best management practices and monitor performance.*
- *Provide training to and communication with staff and affected tenants regarding environmental goals, objectives and targets and their respective roles and responsibilities in fulfilling them.*
- *Incorporate monitoring of Massport and Massport tenants' environmental activities.*
- *Include the preparation of an annual environmental performance report which will be made available to staff, tenants, customers and the general public.*

Enhancements for Sustainability

One way ports have combined both environmental and social goals is to make policy information readily available in more than one language. To that end, the Port of Corpus Christi Authority has published its environmental policy statement in both English and Spanish, so it could be understood by its native Spanish-speaking employees and by the community.[20]

Other ports are developing **sustainability mission statements** or **value statements**. For example, in January 2005 the Board of the Port of Long Beach adopted a Green Port Policy that serves as a guide for decision making and establishes a framework for environmentally friendly port operations. The policy's five guiding principles are:

- Protect the community from harmful environmental impacts of port operations;
- Distinguish the port as a leader in environmental stewardship and compliance;
- Promote sustainability;
- Employ best available technology to avoid or reduce environmental impacts; and
- Engage and educate the community.[21]

Outside the U.S., the Port of Brisbane, Australia, has posted its environmental policy statement on the Internet.[22] This statement addresses broader port sustainability, including economic resources and stakeholder involvement:

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[20] To read the port's environmental policy statement in Spanish, please refer to the 1st Ports EMS/SMS Assistance Project, Final Report, May 2006.

[21] See www.polb.com/environment/green_port_policy.asp, accessed March 28, 2007.

[22] See www.portbris.com/au, accessed March 30, 2007.

Our environmental policy is to develop and implement best-practice strategies and systems to minimize the environmental impacts of our operations and promote the development of a sustainable port.

The Port of Brisbane Corporation is a commercial port operator whose corporate purpose is to be a world class facilitator of integrated solutions for the logistics and business development requirements of its customers. To achieve this its prime objectives are:

- *Adopting leading planning principles and management systems;*
- *Working cooperatively to ensure a safe and secure port environment;*
- *Providing world-class infrastructure; and*
- *Behaving at all times in line with our corporate values.*

A successful port is an essential part of the economic resources of the national, regional and local communities. In operating as a successful port business, the Port of Brisbane Corporation is committed to ensuring that the activities of the Corporation are conducted in an ecologically sustainable manner with a high standard of environmental performance. This will be achieved while ensuring that the needs of the community and the values attached to natural and physical resources are taken into account in corporation planning and the way in which business is conducted.

To achieve environmental performance consistent with this policy, the Port of Brisbane Corporation will employ the following principles:

Planning
- *To include environmental considerations in the Corporation's decision making.*
- *To provide adequate resources for employees at all levels to fulfill their responsibilities as directed under this policy.*
- *To implement procedures to enable activities to be carried out in an environmentally responsible way.*
- *To set environmental objectives and targets for Corporation activities and to review these on an annual basis.*
- *To conduct regular review of the Corporation's environmental performance and act on the results.*
- *To continuously improve the environmental performance of the Corporation.*
- *To continuously improve the environmental management system of the Corporation.*

Practices
- *To meet environmental standards in the Corporation's key activities.*
- *To assess the environmental impacts of the Corporation's activities.*
- *To plan, design, operate and complete any operation in a manner that reduces environmental risks.*
- *To monitor environmental compliance in a professional manner.*
- *To abide by and comply with the Environmental Protection Act 1994 and all other applicable environmental laws, regulations, policies, standards and codes of practice.*
- *To comply with the codes of practice of appropriate industry representative organizations.*
- *To prevent pollution from Corporation activities*

People
- *To appoint staff and contractors on criteria which include that they have the appropriate skill and experience to carry out work in a way that is compatible with good environmental performance and this policy.*
- *To train staff to have the appropriate skill and experience to ensure that operations are completed with the utmost respect for the environment.*

- *To specify the need for all contractors to carry out their work in accordance with this Environmental Policy and to supervise such compliance.*
- *To communicate with affected individuals, community and Government bodies about the Corporation's activities as relevant.*
- *To give due consideration for local culture and custom.*

The Port of Brisbane Corporation will hold employees and contractors accountable for their implementation of this Environmental Policy.

This Policy will be reviewed annually.

Jeff Coleman, Chief Executive Officer

Element 3: Identify Relevant Legal and Other Requirements

Compliance with legal requirements is one of the main pillars upon which your environmental policy (Element 2) should be based, because the potential costs of non-compliance (e.g., possible damage to the environment, revenue loss, and impact on public image) can be very high. Therefore, your port should develop a procedure to identify, access, analyze, and communicate applicable legal and other requirements and ensure that these requirements are factored into the organization's management efforts. In addition to federal regulations, be sure to check with your state and local authorities to determine other applicable requirements and permitting conditions. Other requirements might include industry or trade group codes of practice, or neighborhood or community association requirements. Because legal and other requirements change over time, your process should ensure that you are working with up-to-date information.

Element 3 in the Field

Many ports are controlled by cities and localities – for example, the City of Houston, the Harris County Commissioners Court, the Harris County Mayors and Councils Association, and the City of Pasadena govern the Port of Houston Authority; the City of Long Beach has control over the Port of Long Beach. Additionally, some states, such as Massachusetts and Maryland, require their agencies to have EMSs. Thus, Massport/Port of Boston was one of the first agencies to develop and implement an EMS; the Maryland Port Administration/Port of Baltimore is currently participating in the 2nd Ports EMS/SMS Assistance Project.

> **Commonly Applicable Federal Environmental Laws**
>
> - **Clean Air Act (CAA):** Establishes ambient & source emission standards & permit requirements for conventional & hazardous air pollutants
> - **Clean Water Act (CWA):** Establishes ambient & point source effluent standards & permit requirements for water pollutants; also includes storm water management requirements
> - **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund):** Establishes a program for cleaning up contaminated waste sites, establishes liability for cleanup costs, & provides reporting requirements for releases of hazardous substances
> - **Emergency Planning & Community Right-to-Know Act (EPCRA):** Establishes a program (the "Toxic Release Inventory") to inform the public about releases of hazardous & toxic chemicals
> - **Hazardous Materials Transportation Act (HMTA):** Establishes standards for the safe transport of hazardous materials
> - **Resource Conservation & Recovery Act (RCRA):** Establishes regulations & permit requirements for hazardous waste management; creates standards for underground storage tanks that hold oil or hazardous substances
> - **Toxic Substances Control Act (TSCA):** Regulates the use, development, manufacture, distribution & disposal of chemicals

Enhancements for Sustainability

Many states, cities, and localities have issued sustainability statements or have construction requirements that may impact port development.

- Oregon has issued several Executive Orders (EOs) regarding sustainability for the 21st century, including its most recent EO 06-02.[23] Oregon ports, including the Port of Portland and USACE-Portland District, operate with full awareness of these state-level EOs. The state also established Toxics Use and Hazardous Waste Reduction Program requirements; USACE-Portland District's EMS facilitated compliance with these newly mandated requirements.[24]

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[23] See www.oregon.gov/ODOT/SUS/Sustainability_Mandates.shtml, accessed March 28, 2007, for additional information on Oregon's sustainability mandates.

[24] From 1st Ports EMS/SMS Assistance Project, Final Report, May 2006.

- Sustainable Seattle is a non-profit organization dedicated to enhancing the long term quality of life in the Seattle/King County area. Senior staff at the Port of Seattle serve on Sustainable Seattle's Board of Directors and Advisory Council.[25]

- In 2006, the Baltimore City Green Building Task Force recommended that Baltimore establish green building standards for city-funded construction and offer incentives to private developers of commercial buildings to build to green building standards.[26] Although these recommended standards would not directly apply to the Port of Baltimore, the growing interest of the community in green buildings could easily manifest itself in calls for the port to adhere to similar standards.

Over time, the federal government has also issued a number of EOs to "green" the government's operations. Most recently, EO 13423 of January 24, 2007, Strengthening Federal Environmental, Energy, and Transportation Management, sets goals for the federal government in the areas of energy efficiency, acquisition, renewable energy, toxics reductions, recycling, renewable energy, sustainable buildings, electronics stewardship, fleets, and water conservation. In addition, this EO requires more widespread use of EMS as the framework in which to manage and continually improve these sustainable practices.

These and other EOs[27] impact port facilities managed by federal agencies, such as MARAD, USACE, and USCG operations. For example, USACE began integrating EMS into its civil works operating facilities in response to EO 13148.[28] Portland District's Channels and Harbors Project was selected, along with 11 other Corps projects, to be among the first to begin implementing an EMS.[29] MARAD was also proactive in setting its Strategic Plan and vision of implementing EMS at facilities under EO 13148.[30]

To the extent that a port extends its EMS to look at links between environmental and security, labor, or social equity issues, additional requirements may apply. For example, the Maritime Transportation Security Act of 2002 (MTSA) defines a "transportation security incident" as a "security incident resulting in significant loss of life, environmental damage, transportation system disruption, or economic disruption in a particular area." MTSA, USCG Regulations 33 CFR Part 105 (regarding USCG's jurisdiction and responsibilities for security planning and execution in and round U.S. waterways), and the general provisions of Chapter XI-2 of the International Convention for the Safety of Life at Sea (SOLAS) and the International Ship and Port Security Code (ISPS Code) address security considerations at ports.

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[25] See www.sustainableseattle.org for additional information on Seattle Seattle's mission, vision, and history, as well as its staff, Board of Directors, and Advisory Council members; accessed March 28, 2007.

[26] Baltimore City Green Building Task Force, Report on Sustainable Building Guidelines and Standards for Public and Private Construction and Renovation Projects, April 2006, http://www.ci.baltimore.md.us/government/planning/images/GreenBuilding.pdf , accessed April 20, 2007.

[27] EO disposition tables are found at www.archives.gov/federal-register/executive-orders/disposition.html, accessed March 28, 2007.

[28] EO 13148, Greening the Government through Leadership in Environmental Management, available at: http://www.epa.gov/EMS/position/eo13148.htm.

[29] From 1st Ports EMS/SMS Assistance Project, Final Report, May 2006.

[30] From 1st Ports EMS/SMS Assistance Project, Final Report, May 2006.

Element 4: Identify Environmental Aspects & Significant Environmental Aspects

In Element 1 you defined the scope of your port's EMS (including entities over which the port exercises control/significant influence), in Element 2 you wrote your port's environmental policy (including commitments for continual improvement and prevention of pollution and waste), and in Element 3 you made sure to identify all relevant legal and other requirements – at the federal, regional, state, and local levels. In Element 4, you use all that information as guideposts to (1) identify **environmental aspects** (EAs) of operations that fall within the scope of the port's EMS; (2) list their actual or potential **environmental impacts** (EIs), quantified to the extent possible; and (3) determine the subset of aspects that have significant impacts.

- EAs are characteristics of a facility's activities, products, or services that either impact the environment or could potentially impact the environment. These impacts could occur during normal, abnormal, accidental, or emergency situations.

- Air emissions from a tug boat are an example of an EA, with the impact being degradation of air quality. Similarly, spills from chemical storage facilities are also an EA, with the impact being degradation of air or water quality. Such EAs may also be **significant environmental aspects** (SEAs) due to legal requirements, port goals or policies, community concerns, potential release to the environment, pollution prevention potential, or other rationale. Once selected, SEAs form the basis for the rest of the EMS.

> **Categories Commonly Used to Determine Significance of EAs**
> - Regulatory concerns
> - Pollution
> - Risk, including: effects of chemicals & materials on workers, impacts on the surrounding community, and impacts on the environment, safety, and noise
> - Natural resource use

Element 4 in the Field

Many ports have catalogued their EAs (e.g., by diagramming their inputs, outputs, or processes), determined associated EIs, developed and applied significance determination methods using a variety of ranking criteria, and selected SEAs on which to target their EMS. Prioritizing their EAs has helped port management focus on controlling those aspects that have the greatest current or potential negative impact on human health and the environment. For example, many U.S. ports are in counties that are in non-compliance with air quality standards for ozone and particulate matter (PM). For those ports, and others that want to be proactive, diesel emissions from both ships and landside sources are likely an SEA.

Common aspects and impacts within typical marine transportation fencelines (e.g., marine terminals and maintenance shops) address not only air quality, but also impacts on land and water quality from ships and shore-side operations. Typical activities within the fenceline may include electrical repair, building maintenance, painting, boat building/repair, truck and fleet maintenance, fueling operations, waste disposal, recycling, snow removal, wharf repair, plumbing, pavement repair, equipment maintenance, roofing, landscape maintenance, property renovation, and storm water management.

For example, after selecting its wellhead protection area as its fence line, key operations and maintenance staff at the Port of Vancouver brainstormed activities that occur within this area and ranked those individual activities according to the following factors to determine the level of perceived impact:

- Human health;
- Natural resources;
- Frequency;
- Volume;
- Toxicity;

- Public perception;
- Costs;
- Probability; and
- Legal requirements.

Following this ranking the port selected the following SEAs:

- Proximity of existing contamination to wellhead area;
- Illegal dumping within wellhead area;
- Tenant chemical use;
- Proximity of rail tracks (and potential for spills and leaks);
- Chlorine transportation, storage, and changing tanks;
- Installation of backflow prevention devices; and
- Drinking water operational procedures.

> "Our port's EMS is helping us identify and prioritize environmental issues, especially those with the greatest impact. It is also helping us document procedures and stay on top of every regulation out there." — Gary P. LaGrange, President & CEO, Port of New Orleans
>
> Source: EPA, AAPA, & GETF. Environmental Management Systems: Systematically Improving Your Performance: Ports Sector, September 2004.

Massport, which operates the Port of Boston as well as major airports, bridges, and commercial areas, identified the following activities that could impact the environment and were deemed to be significant or occur at all Massport facilities:

- Vehicle/equipment maintenance;
- Administrative activities;
- Landscaping;
- Snow removal;
- Pavement maintenance;

- Building maintenance;
- Civil/site construction;
- Deicing; and
- Oil/water separator maintenance.

Massport then identified the following environmental aspects of those activities:

- Fluids;
- Parts;
- Electricity;
- Water;
- Hazardous and solid waste disposal;
- Paper and office supplies/equipment;
- Pesticides/herbicides;
- Fuel for vehicles;
- Salt/sand runoff;
- Vehicle emissions;
- Snow melter water discharge,
- Sedimentation,

- Runoff and wastewater;
- Concrete;
- Noise;
- Fuel for HVAC;
- Miscellaneous materials;
- Topsoil/fill;
- Construction debris;
- Dust;
- Contaminated soil;
- Chemical deicer and runoff from deicer; and
- Stormwater discharge.[31]

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[31] From 1st Ports EMS/SMS Assistant Project, Final Report,. May 2006.

Massport then identified the following potential environmental impacts:

- Resources for maintenance fluids and parts;
- Resources for electricity;
- Water use;
- Land for hazardous and solid waste disposal;

- Resources for paper and office supplies; and
- Pesticide/herbicide disposal.[32]

Some examples of environmental aspects and impacts the Port of Brisbane, Australia, identified in its audit of all work sites and activities include the following:[33]

Environmental Aspect	Environmental Impact
Hosing down the deck of a vessel resulting in the discharge of sediments, oils and greases into the waterway	Contamination of the waterway through increased turbidity and contaminants
Spills of fuels and oils from parked vehicles entering the waterway or paved areas through stormwater flows	Contamination of the soil, groundwater, and surface waters
Purchase of materials and equipment without due consideration for environmental sustainability (i.e., excessive packaging, hazardous waste by-products, excessive noise generation)	Depletion and inappropriate use of natural resources

Enhancements for Sustainability

Environmental aspects and their indicators may cover universally accepted performance related to inputs (e.g., materials, energy, water) and outputs (e.g., emissions, effluents, and waste), as well as performance related to biodiversity, environmental compliance, environmental expenditures, transport, and the impacts of products or services.

For example, the Gijón Port Authority, Spain, participated in a 2006 research study assessing the port's "ecological footprint" as a macroindicator of sustainability.[34] Until that time, this macroindicator had been applied to cities, regions, or countries, but not entities such as ports. Ecological footprints account for the consumption of natural resources by converting them into hectares (ha) of "nature" or consumed productive land. Parameters analyzed included consumption of energy, fuel, material, paper, wood, water, built land, and green areas, and residues generated by the port. The results showed a net ecological footprint of 3,279.84 ha, comprising primarily construction works and electricity usage. Studies of this kind may enable ports to design sustainable development plans to reduce consumption as well as develop green services and create "natural capital," as the scope of impact is better understood.

The Port of Portland developed and implemented a natural resources assessment and management plan (NRAMP), a management and planning tool that provides port staff with a single source of all natural resource data (including inventories and maps) about port and surrounding properties. In addition, NRAMP contains modeling, alternatives analysis, monitoring, and adaptive management features that allow port staff to evaluate the potential effects of management actions on the resources.[35]

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[32] Massachusetts Port Authority Sustainability Plan, October 2004; www.mass.gov/envir/Sustainable/pdf/massport_sustainability_plan.pdf, accessed March 28, 2007.

[33] See www.portbris.com/au, accessed March 30, 2007.

[34] See abstract on second to last link on the following web page: www.pubsindex.trb.org/document/view/multi.asp?pub=1&recordlist=792675%7C, accessed March 30, 2007.

[35] See AAPA award to this port at www.aapa-ports.org/Programs/content.cfm?ItemNumber=748&navItemNumber=696; accessed April 2, 2007.

Other broader aspects of sustainability may also already be captured through an EMS. For example, social aspects, such as occupational health and safety, training and education, security practices, community relations/involvement, and compliance, may be addressed within an EMS (e.g., through Element 2, Environmental Policy Statement, or through subsequent elements).

Under the Global Reporting Initiative Framework, Sustainability Common Denominators Include the Following Economic & Social Aspects or Indicators:

Economic:
- Flow of capital among different stakeholders
- Main economic impacts of the organization throughout society (e.g., economic performance, market presence, indirect economic impacts)

Social: Labor Practices & Decent Work
- Employment
- Labor/management relations
- Occupational health & safety
- Training & education
- Diversity & equal opportunity

Social: Human Rights
- Investment & procurement practices
- Non-discrimination
- Freedom of association & collective bargaining
- Complaints & grievance practices
- Security practices

Social: Society
- Community
- Corruption
- Public policy
- Anti-competitive behavior
- Compliance

Social: Product Responsibility
- Customer health & safety
- Customer privacy
- Compliance

Source: Global Reporting Initiative website, http://www.globalreporting.org/ReportingFramework/G3Online/PerformanceIndicators/, accessed April 20, 2007.

Element 5: Establish Objectives, Targets, and Action Plans

Once you have identified your SEAs, you are also ready to set environmental objectives and targets. Objectives and targets help your port continuously improve its environmental performance. An environmental **objective** is an overall environmental goal arising from your port's environmental policy statement (Element 2). Environmental **targets** are detailed performance requirements that are based on an environmental objective and are quantified whenever practicable. While all SEAs need operational controls, not all need objectives and targets. In setting objectives and targets, the port should consider its environmental policy commitments to prevent non-compliance, prevent pollution at its source, minimize cross-media pollutant transfers, and continuously improve its environmental performance.

> **In Setting Objectives & Targets, Keep Your Environmental Policy Commitments in Mind While Also Considering the Following Factors:**
>
> - SEAs
> - Legal and other requirements
> - Statewide environmental initiatives
> - External trends & influences
> - Stakeholder concerns/views
> - Business/operational needs & financial concerns
> - Organizational considerations
> - Technological options
> - Port's ability to control, track, & measure
> - Cost to track & measure
> - Progress reporting

Action plans document SEAs, operational controls, objectives, and targets. Action plans, also known as **Environmental Management Plans** (EMPs) or **Implementation Plans**, translate your policy commitments into concrete actions – they form the bridge between concept and application. EMPs should define: (1) the responsibilities for achieving the objectives (i.e., who will do it?); (2) the means for achieving objectives (i.e., how will they do it?); and (3) the timeframe for achieving the objectives (i.e., when?). Keep in mind that EMPs should be dynamic. For example, consider modifying your programs when objectives and targets are modified or added; relevant legal requirements are introduced or changed; substantial progress in achieving your objectives and targets has been made (or has not been made); your services, processes, or facilities change; or other issues arise.

Considerations for Developing Objectives and Targets
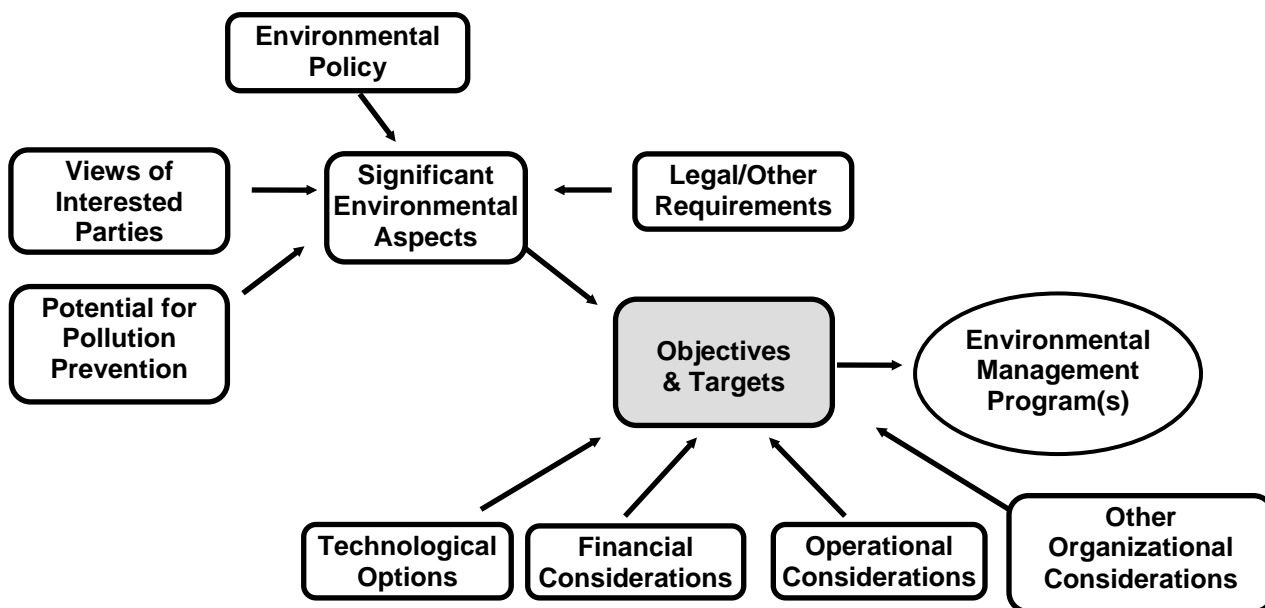
Element 5 in the Field

Targeting their SEAs and considering other factors, ports have developed general objectives (e.g., minimize impacts to air quality, minimize impacts to water resources, reduce waste generation and hazardous materials use, minimize impacts and seek opportunities to enhance natural resource, reduce energy consumption, purchase energy from sustainable sources) as well as detailed, specific targets. Three examples are provided below from the 1st Ports EMS/SMS Assistance Project.

The Port of New York and New Jersey selected public berthing areas, maintenance facilities, and dredging operations as its fenceline; identified 10 SEAs within the fenceline; developed operational controls for all 10 (see Element 6); and set objectives and targets for 3:

1. Reduce water loss at the Public Berthing facilities in NY and NJ in volume and cost by 20% by December 2006. Due to the nature of the water distribution system configuration at NJ Marine Terminal, the scope of this effort was expanded to cover the entire NJ facility.
2. Reduce solid waste from fender system repairs at the public berthing facilities in NY and NJ by 25% by May 2007 by specifying the use of more structurally resilient material and recycling old fenders.
3. Reduce NOx emissions from dredging operations for the Harbor Deepening Project to a net zero on an annual basis starting June 2005 and ending by December 2014.

The Port of Portland, which selected two facilities for its fenceline – Marine Facility Management (MFM) and Portland International Airport (PDX) General Maintenance – established the following objectives and targets for 2004/2005 maintenance operations:

1. *Objective:* Minimize Impacts to Air Quality. *Targets:* Reduce idling/transaction time by 50% at PDX parking toll plaza by June 2005; take five actions by June 2005 to reduce diesel particulate emissions; and identify air quality improvements through energy source changes for PDX gate & ground service equipment by completing preliminary engineering & economic evaluations by June 2005.
2. *Objective:* Minimize Impacts to Water Resources. *Targets:* Complete water efficiency evaluations for three port water systems by June 2005; and reduce the amount of treated timber chocks at T6 container yard by 20% by June 2005.
3. *Objective:* Reduce Waste Generation and Hazardous Materials Use. *Targets:* Assess environmental and safety impacts of chemical products used at Aviation and Marine maintenance facilities and eliminate or substitute at least six products at PDX by June 2005 and another six at MFM by March 2006.
4. *Objective:* Minimize Impacts and Seek Opportunities to Enhance Natural Resources. *Targets:* Organize a weekend event for Port staff to clean up Port-owned shorelines by June 2005.
5. *Objective:* Reduce Energy Consumption. *Targets:* Evaluate new technology to determine financial and technical viability and of the Eco-start motor energy controller [*placeholder target until evaluation is completed*]; and conduct three building energy audits at port facilities and implement viable projects by June 2005.
6. *Objective:* Purchase Electric Energy from Sustainable Sources. *Targets:* Purchase 3% of PDX's, 5% of Marine's, and 5% of the Port Building's electric power from sustainable wind-generated sources in 2004/2005.

The Port of Virginia identified 45 SEAs and then chose to address its remote fueling operations, corrective and preventive maintenance processes, container/strad wash area operations, and the facilities' lighting replacement program at Norfolk International Terminals (its fenceline) as follows:

1. *Objective:* Reduce potential for fuel spills from remote fueling operations. *Target:* Upgrade remote fueling equipment and implement procedures with the target of reducing spill frequency by 10%.
2. *Objective:* Reduce use of energy inefficient F-40 lamps and magnetic ballasts in office areas. *Target:* Replace 75% of all F-40 light fixtures with T-8 fixtures by 2007.
3. *Objective:* Establish methods to decrease the waste products from performing corrective and preventive maintenance and to ensure these by-products are properly disposed of or recycled.

Target: Benchmark the amount of recyclable waste and develop goals that will increase recycling efforts by June 2006.

4. *Objective:* Reduce the zinc level in waste water from container and straddle carrier wash down operations. *Target:* Reduce the monthly sampled zinc levels in the waste water stream by 25% from calendar year 2005 average level at the Container and Straddle Carrier Wash Area by December 2006.

Enhancements for Sustainability

In developing its Green Port Policy, the Port of Long Beach conducted a gap analysis to document what it was doing as well as what more it needed to do, and then used that information to set objectives and targets. The resulting Green Port Policy includes six basic program elements (four specific environmental elements as well as broader social and overarching sustainability elements), each with an overall goal:

*   Wildlife – Protect, maintain or restore aquatic ecosystems and marine habitats;
*   Air – Reduce harmful air emissions from Port activities;
*   Water – Improve the quality of Long Beach Harbor waters;
*   Soils/Sediments – Remove, treat, or render suitable for beneficial reuse contaminated soils and sediments in the Harbor District;
*   Community Engagement – Interact with and educate the community regarding Port operations and environmental programs; and
*   Sustainability – Implement sustainable practices in design and construction, operations, and administrative practices throughout the Port.

In addition to overall principles and the goals for each component, the policy includes metrics (scientific measurements of the port's environmental progress), and a commitment to regular reporting. The port has been developing metrics for various elements; those that have been developed are presented in periodic updates as well as the 2005 Green Port Annual report.[36] Note that the port has not developed numerical goals or metrics for either community engagement or sustainability; rather, progress on those two elements is reported as it occurs.

Massport has also developed Sustainable Design goals that address:

*   Asset Management – Increase value and revenue generating potential of projects, demonstrating to developers/investors that port is a competent partner;
*   Environmental Benefits/Permitting Strategy – Reduced impacts and permitting time;
*   Citizenship – Positive community impact by demonstrating that port is actively reducing environmental impacts; and
*   Design Excellence – Innovative, aesthetic and responsible design.[37]

In 2006, Massport achieved LEED Certification for the world's first LEED-certified airport terminal, Boston Logan International Airport's Terminal A.[38] The Leadership in Energy and Environmental Design Green Building Rating System™ is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings.

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[36] See www.polb.com/about/publications/green_port_annual.asp, accessed March 28, 2007.

[37] Why Build Green? ACI-NA Environmental Affairs Committee Meeting, May 15, 2005; www.aci-na.org/docs/41%20SAN%2005%20Catherine%20Wetherell%20Massport%20LEED.pdf; accessed March 28, 2007.

[38] See www.massport.com/about/press_news_taleed.html, accessed March 28, 2007.

Element 6: Develop Operational Controls
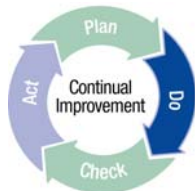
Operational controls are documented procedures, work instructions, BMPs, posted placards, and action plans that ensure that operations and activities (such as wastewater discharge monitoring, waste management, and environmental performance improvement) are carried out effectively. At least one operational control should be in place for each SEA identified in Element 4 to ensure compliance with legal requirements and company policies or to achieve improvement objectives.

Element 6 in the Field

Ports may already document most of the operational controls needed at the facility, so it is likely you would not have to start from scratch. Ports that have implemented EMSs have documented operational controls to address compliance assurance and environmental improvement objectives.   The following examples are from the 1st Ports EMS/SMS Assistance Project.

- The Port of Los Angeles, for example, developed operational controls as part of its EMS, establishing standard operating procedures (SOPs) for SEAs. Documenting these operational controls promoted "buy-in" from all employees into the EMS, ownership from employees of the significant activities, transfer of institutional knowledge from long-time staff to new employees, and assurance that all shifts conduct the activities under SOPs.

- The Port of Vancouver also saved operator institutional knowledge by clearly documenting through its EMS procedures for drinking water system operation and compliance management. Formalizing previously informal processes ensures that institutional knowledge of long-time port employees is captured.

There are a number of ways that ports can ensure that operational controls are implemented by those with whom the port does business.

- The Port of Houston Authority is putting environmental performance expectations for air emissions in construction contracts and in tariffs with stevedores. The port also has documented "roll down" clauses in its contracts; if tenants, vendors, or contractors cause a notice of violation (NOV), they may be fined or fired by the port.

- The Port of Seattle has a memorandum of agreement (MOA) with the cruise industry, which is now using low-sulfur fuel and shore-side electric power for cruise ship auxiliary power needs at dock.

- The Ports of Los Angeles and Long Beach have supplemented the requirements in their tenant leases. While it is common practice for ports to articulate in their leases that their tenants must

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**Sample Activity Areas &
Operational Controls for a Port**

Water quality management:
- Connect floor drains to sanitary sewer or dead-end sump.
- Provide adequate space for storage of chemicals and waste products.
- Provide oil/water separators on floor drains.
- Pave fueling areas with concrete rather than asphalt.
- Design fueling areas to prevent the run-on of storm water and the runoff of spills.
- Use sand filters to capture spills and runoff of paint stripping operations.
- Ensure adequate secondary containment for catastrophic failures of bulk liquid storage facilities.

Air quality management:
- Install and maintain vapor recovery systems for fueling operations and for storage and handling of bulk liquids.
- Install dust suppression mechanisms for dry bulk storage and handling activities.
- Provide paint booths to contain overspray and treat air emissions when painting equipment.
- Cover painting/stripping area.
- Minimize the quantity of soil exposed at one time during construction activities.

Source: AAPA. *Environmental Management Handbook. September 1998.* http://www.aapa-ports.org/Issues/content.cfm?ItemNumber=989.

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comply with applicable environmental laws and regulations, these two ports have used additional "green lease" language with some of their marine terminal tenants. These ports are in a position to do this because of the scarcity of highly desirable land available for marine terminals in the country's busiest import market, and because of severe air pollution and extreme pressure from regulators and other stakeholders to reduce the human health risk of port-related operations.[39] The

> "Morale is high. When we presented the EMS initiative to our maintenance and facility personnel, we stressed that the suits are not coming down and telling you what to do. We all work side-by-side, and when we start identifying procedures, everyone is involved in the process." — Rick Larrabee, Director, Port Commerce Department, Port Authority of New York & New Jersey
>
> Source: EPA, AAPA & GETF. Environmental Management Systems: Systematically Improving your Performance: Ports Sector, September 2004.

lease agreement signed by the Port of Los Angeles and P&O Nedlloyd in January 2006 requires that the following operational controls be used:

o   Switch to low sulfur (1.5% or less) fuel in main and auxiliary engines of container ships when 40 nautical miles of the port;
o   Reduce vessel speed when within 40 nautical miles of the port;
o   Outfit ships for Alternative Marine Power (AMP), i.e., ship to shore-side power – 30% by the end of the 2nd year, 70% by the end of the 3rd year;
o   Use alternative fuel, e.g., liquefied natural gas (LNG), in yard tractors;
o   Use emulsified fuel and Diesel Oxidations Catalysts (DOC) on older yard equipment, where feasible;
o   Use on/near dock rail;
o   Use non-ozone depleting compounds in refrigerated containers; and
o   Use housekeeping/maintenance procedures that limit water use and minimize discharges.[40]

Enhancements for Sustainability

Operational controls extend to other sustainability measures, including community relations. For example, reporting a release or oil spill to the federal, state, or local government (see Element 7) entails following documented procedures. A port may also develop BMPs to convey such information to the public as well as crisis communication plans to address media inquiries (see Element 9).[41]

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[39] For further information, see the *San Pedro Bay Port Clean Air Action Plan*, the most comprehensive strategy to cut air pollution and reduce health risks ever produced for a global seaport complex; www.portoflosangeles.org/environment_air.htm.

[40] Port of Los Angeles press release entitled, *Port of Los Angeles Harbor Commissioners Certify Environmental Impact Report with Landmark Environmental Measures*, dated January 19, 2006, http://www.portoflosangeles.org/Press/REL_BHC%20Approves%20206-209%20EIR.pdf, accessed April 25, 2007.

[41] See www.aapa-ports.org/search/browseResults.cfm?MetaDataID=27 for several presentations on communications and the media; AAPA's 2006 seminars. The Port Manatee Crisis Communications Plan is also provided as a best practice manual on AAPA's web site; see www.aapa-ports.org/Issues/IssueDetail.cfm?itemnumber=1146. Both sites accessed March 28, 2007.

Element 7: Develop Emergency Preparedness and Response Program

Despite a port's best efforts, accidents and other emergency situations may occur. Effective preparation and response can reduce injuries, prevent or minimize environmental impacts, protect employees, and neighbors, reduce asset loss, and minimize downtown. An effective emergency preparedness and response program (EP&R) should include provisions for (1) assessing the potential for accidents and emergences; (2) preventing incidents and their associated EIs; (3) responding to incidents through emergency plans and procedures; (4) testing of emergency plans and procedures periodically; and (5) mitigating impacts associated with accidents and emergencies. Like Element 6, Operational Controls, this is another area where you should not have to start from scratch, since several environmental, health & safety (EH&S) regulatory programs require emergency plans and/or procedures, for example:

- Clean Air Act Amendments: Risk Management Program;
- Clean Water Act: Spill Prevention, Control and Countermeasure Plan (SPCC) and Storm Water Pollution Prevention Plans;
- Emergency Planning and Community Right-to-Know Act: Community Right-to-Know Reporting and Coordination with Local and State Emergency Response Committees;
- Oil Pollution Act: Facility Response Plan (portions of port not subject to USCG contingency plan requirements) and SPCC;
- Resource Conservation and Recovery Act: Contingency Plan (for large quantity generators) and Preparedness and Prevention Plans (for large quantity and small quantity generators); and
- USCG: Facility Response Plan (FRP).

The Occupational Safety and Health Act also requires Process Safety Management controls.

Element 7 in the Field

Some ports address these numerous EH&S requirements through Integrated Contingency Plans (ICPs), which combine the requirements of numerous regulatory programs into one plan. The federal government has issued guidance for such a plan, known as the "One Plan." To access information on the One Plan, use the following website link to EPA – http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/sta-loc.htm – and scroll down to the section entitled: "The National Response Team's Integrated Contingency Plan Guidance (One Plan)."

Enhancements for Sustainability

Following up on enhancements noted in Element 3, Legal Requirements, and FRP requirements noted above, ports should be in compliance with new USCG security regulations, which are in place to protect commerce, port assets, and personnel. The federal government is also funding other port security and supply chain pilot programs. For example, the Ports of Seattle and Tacoma, the Port Authority of New York and New Jersey, and the Ports of Los Angeles and Long Beach are leaders in Operation Safe Commerce, a federal program designed to create the knowledge base required for international standards for containerized shipping.

Regarding lessons learned in recovering economically from natural disasters, including keeping the community informed:[42]

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[42] See www.aapa-ports.org/search/browseResults.cfm?MetaDataID=27 for several presentations on lessons learned regarding emergency management, disaster recovery, and security; AAPA's 2006 seminars; accessed March 27, 2007.

- Ports have developed business Continuity of Operations (COOP) plans – advance procedures that allow critical business functions to continue during a disaster.[43]

- Following Hurricane Katrina, however, the Port of New Orleans noted its comprehensive Hurricane Preparedness Plan simply could not envision the extent of the storm's aftermath, which affected 96,000 square miles – an area larger than the British Isles.[44] The plan, for example, provided for (1) preparation and clean up, but not how to provide housing for employees; (2) communications network based on cell phones, but no provisions for 300 cell towers being destroyed; and (3) short evacuation, but not for extended evacuation of 90 days or more. Following Katrina port staff improvised by:

  o Establishing two headquarters: an operational headquarters in New Orleans staffed by key personnel led by President & CEO Gary LaGrange, as well as an administrative headquarters in Atlanta led by COO Dave Wagner – eventually moved to Ponchatoula, LA, courtesy of Port Manchac;
  o Establishing lines of communication with key senior staff;
  o Remotely accessing main frame computers; and
  o Arranged housing through MARAD.

  The port summarized its lessons learned as follows:

  o Chain of Command – Know where staff are, provide for multi-tasking;
  o Communications – Establish guidelines for worst case scenarios;
  o Lines of Responsibility – Back up chains for major catastrophes;
  o Housing – Establish temporary quarters;
  o FEMA – As a partner rather than a leader; and
  o Media Relations – Be accessible, be positive, and lead the way.

- Shortly after the devastating hurricanes of 2005, AAPA convened a working group that sponsored five workshops over six months to collect member experiences with emergency planning and disaster recovery. With the information gathered from these workshops, AAPA has developed an emergency preparedness and COOP planning manual for its members.[45]

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[43] See, for example, "Business Continuity Port Operations," Cosmo Perrone, Director of Security, Port of Long Beach, presentation at 2006 AAPA Emergency Preparation and Response Seminar, www.aapa.files.cms-plus.com/SeminarPresentations/06%5FEmergency%5FPerrone.pdf, accessed March 28, 2007.

[44] "Crisis Management and How Hurricane Katrina Changed the Dynamics", J. Robert Jumonville, Sr., Director of Cruise and Tourism, Port of New Orleans, presentation at AAPA 2006 Cruise Seminar, www.aapa.files.cms-plus.com/SeminarPresentations/06%5FCruise%5FJumonville.pdf, accessed March 28, 2007.

[45] AAPA, Emergency Preparedness and Continuity of Operations Planning Manual for Best Practices, http://www.aapa-ports.org/Issues/IssueDetail.cfm?itemnumber=1161; accessed March 27, 2007.

Element 8: Set Up a Training Program for Competence and Awareness

Each person and function within a port can play a role in environmental management. Employees, tenants, and managers should be aware of the environmental policy, the SEAs and related procedures that apply to their work, key EMS roles and responsibilities, and the importance of meeting EMS requirements. Employees also should understand what might happen if they don't meet EMS requirements, such as spills, releases, and fines or other penalties.

All employees will require **environmental awareness training** that covers an introduction to EMSs, the port's environmental policy, SEAs and environmental goals. Employees whose jobs are associated with SEAs will also require appropriate **task-specific training** and support to be competent in their work. Training is just one element of establishing competence, which is typically based on a combination of education, training, and experience.
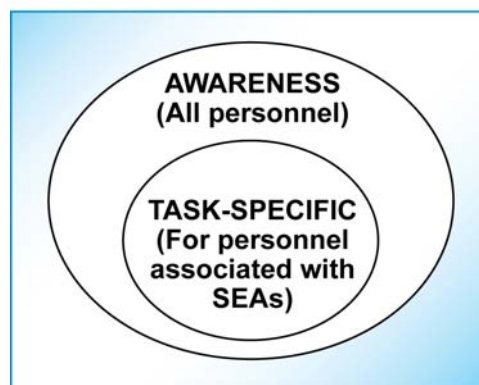
> **Examples of Areas Where Training is Needed**
>
> - Legal and other requirements
> - Ability to recognize new problems
> - Technical skills needed to solve problems
> - Procedures to implement operational controls
> - Any new procedures or needs related to SEAs
> - Awareness of the port's environmental policy, EMS, and objectives

Element 8 in the Field

Improved environmental awareness on the part of employees, as well as tenants and other contractors, is a benefit of EMS programs. Unless otherwise noted, the following examples are from 1st Port EMS/SMS Assistance Project.

- The Port of Los Angeles conducted EMS General Awareness training sessions, which increased communication of environmental issues and, in turn, broadened port-wide awareness of issues within the fenceline. Its EMS Internal Auditor training also reinforced the concept that the results of internal audits drive the continual improvement of an EMS and, as a result, improve environmental performance.

Types of Personnel Training

- The Port of Houston conducts environmental training for its tenants twice per year. These sessions started out as awareness training, but as the knowledge level of the tenants has increased, the training has become more detailed and now focuses on changes or potential changes to applicable regulations. If the port's tenant audit program identifies any widespread weaknesses, the port will arrange training on those topics.[46]

- The Port of Corpus Christi conducts extensive environmental training for its employees and places posters and brochures in areas where employees will see them. The port has customized its training by type of employee and has also developed wallet-sized cards that list significant aspects for each job (e.g., painting crew, welding crew, mechanic).[47]

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[46] Phone conversation with Aston A. Hinds, Environmental Affairs Manager, Port of Houston Authority, April 20, 2007.

[47] Phone conversation with Sarah Kowalski, Environmental Compliance Manager, Port of Corpus Christi Authority, April 20, 2007.

- Under its voluntary Green Ports Tenant Environmental Awareness Program, the Port Authority of New York and New Jersey developed and presented an environmental awareness program for the port's Seaport tenant community. This program, free of charge to tenants, presented a comprehensive review of environmental aspects affecting tenant business operations including legal regulatory requirements, BMPs, pollution prevention, "green" design and construction, permitting requirements, and grants and financial incentives.[48]

## Enhancements for Sustainability

Ports are beginning to look more broadly at sustainability training. For example, the Port of Long Beach has developed a sustainability training DVD for employees at the port. Ports may include LEED certification in their sustainability training. As previously noted in Element 5, Massport is actively pursuing LEED certification for many of its green building efforts.

AAPA itself has already started providing training on sustainability for its members. For example, a session on port sustainability was offered at the June 2006 meeting of AAPA's Harbors, Navigation, and Environment Committee.[49]

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[48] See AAPA award to the port at www.aapa-ports.org/Programs/content.cfm?ItemNumber=748&navItemNumber=696; accessed April 2, 2007.

[49] The presentations from this session can be downloaded from the AAPA website. Please visit: http://www.aapa-ports.org/Programs/PastDetail.cfm?itemnumber=954.

Element 9: Create a Communications Strategy
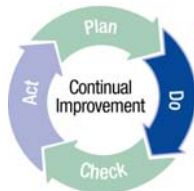
 An EMS should define the process for proactive, two-way, internal and external communication.

Internal communication should provide information about environmental requirements and voluntary commitments to all employees, on-site service providers, and contractors whose work could affect your ability to meet those requirements and commitments.

External communication should provide information on your environmental programs and accomplishments to other stakeholders and include a way to provide feedback. Stakeholders include anyone who has a stake in your facility's environmental performance.

You may appoint a community liaison to manage external communications concerning EAs at your facility, for example, responding to inquiries from interested parties and regulatory agencies; sending current copies of the environmental policy to interested parties, and responding to media inquiries.

> **Internal Stakeholders Include:** Employees, shareholders, customers, suppliers, investors & insurers, trading partners, etc.
>
> **External Stakeholders Include:** Neighbors, community organizations, environmental groups, other external companies, the media, the general public, etc.

Element 9 in the Field

Through communications programs, ports are able to convey their EMS policy, objectives, targets, and progress to date. EMS improves cross-functional communications and cooperation. The following examples are from the 1st Ports Ems/SMS Assistance Project:

- EMS Core Team meetings at the Port of Los Angeles and Port of Portland, for example, created a forum where employees from different divisions could come together to discuss specific environmental topics. Use of these forums increased the ports' communications on environmental issues and, in turn, broadened awareness of port-wide issues throughout the fenceline.

- Creation of the EMS at Los Angeles also included a Continual Improvement Form (CIF) that was widely distributed throughout the facility and continues to be available for all employees. This form has acted as a communications tool for employees to identify and record environmental concerns as they are observed, and for management to respond to issues identified.

> "Because a residential area abuts our port, outreach to the surrounding community is a priority. At Massport, we strive to be good corporate citizens as well as good neighbors. Informing the local community about various Massport programs and initiatives at our facilities helps us to accomplish this. Our efforts to implement more sound environmental policies, such as those outlined in the EMS, are certainly appreciated and in this case applauded." — *Michael A. Leone, Port Director,* Massport
>
> Source: EPA, AAPA & GETF. Environmental Management Systems: Systematically Improving your Performance: Ports Sector, September 2004.

- The Port of Vancouver increased staff, tenant, and contractor awareness of potential impacts to its wellhead protection area (its fenceline) by preparing voluntary drinking water quality confidence reports for tenants and other water users, installing wellhead signage, and creating an Automotive Hazardous Waste Disposal Flyer for tenants.

Enhancements for Sustainability

Some ports are expanding their community relations as part of their ongoing EMS programs.

- Massport's approach to sustainability includes a goal of developing an EMS for each facility. These EMS projects are showing Massport's leadership and corporate citizenship by going beyond 1-way

public relations to 2-way dialogues. "By pledging our commitment to public service leadership, we accept Massport's obligation to serve multiple stakeholders, each of whom should be considered in the development of our policies and our day-to-day decision-making. We acknowledge that only through open communication and with an open mind, weighing equally all sides of an issue, can we find resolutions that will benefit the greater public good."[50]

- Other ports, such as the Port of Long Beach, are looking at a tiered approach to sustainability communications – first looking within their organization (i.e., at their employees, over whom they have direct control (see discussion of scope in Element 1)), and then developing a strategy to involve tenants and the broader community.

- The Port of Brisbane, Australia, developed a Community Consultative Committee, which comprises representatives from conservation, business, and community groups with an interest in the port's activities and its impact on neighboring communities. This committee provides a link to stakeholders and local communities through which the port raises awareness about its activities, development, and plans for the future. The committee meets quarterly.[51]

> **What Communities Sometimes Fear Or Don't Like About Ports**
>
> - Air & water pollution, & potential health effects
> - Road congestion
> - Destruction of wetlands, habitat
> - Land contamination, including brownfields
> - Noise during construction & operation
> - Night lighting & glare
> - Dust
> - Visual impacts (e.g., "ugly" cranes, bright lights)
> - Competition with recreational uses of water/land
> - Disturbance of cultural resources
>
> **What Communities Want From Ports (Besides Jobs & Goods)**
>
> - A say in decisions that affect their lives
> - A transparent decision-making process, especially for new projects
> - Monitoring & reporting on environmental issues, e.g., ambient air & water quality monitoring
> - Objectives/targets for continuous improvement in environmental performance

As part of their external communication strategy to engage the community in decisions that affect them, ports can become attuned to operational improvements that, while seemingly minor, make a large, positive difference to the surrounding community.

- To minimize noise pollution, some ports have been able to reduce the backup alert beeper on trucks and equipment to a level that ensures safety while also reducing decibels.

- To reduce their visual impacts, ports have painted their cranes blue or gray so they blend better in with the sky and water; others have purchased cranes that can partially retract when not in use.

- Fremantle Ports-Western Australia funded the planting of 4,805 trees over three years in the Lake Chinocup catchment area in the Great Southern. Not only are these trees visually pleasing, but also they offset the greenhouse gases emitted by the port's vehicle fleet.[52]

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[50] Massport Sustainability Plan, October 2004, www.mass.gov/envir/Sustainable/pdf/massport_sustainability_plan.pdf, accessed March 28, 2007.

[51] See www.portbris.com.au/community, accessed March 30, 2007.

[52] See www.fremantleports.com.au/environmentsafety/index.asp, accessed March 30, 2007.

Element 10: Set Up Documentation for the EMS
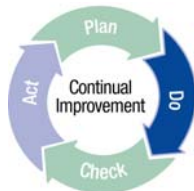
Documentation is a requirement of an EMS, but it should not be the main emphasis. Limit your documentation efforts to the minimum necessary. EMS documentation is different than EMS records. **EMS documentation** describes what you do and how you do it, while **EMS records** demonstrate that you are doing what the documentation said you would do.

Some sort of EMS Manual, either electronic or hard copy, can be your EMS documentation and should:

- Describe the core elements of your EMS and how the elements interact; and
- Provide direction to related documentation.

Element 10 in the Field

Record keeping and document management improve port scheduling, tracking, and funding projections, and establish a systematic record for tracking environmental initiatives and developments. As noted in the 1st EMS/SMS Assistance Project Final Report:

- Through its documented system, the Portland District-USACE has been able to share EMS information with other projects and USACE leadership.

- The Port of Corpus Christi Authority's EMS program has changed the way the Port manages its environmental affairs. Employees have seen the many benefits of the EMS program, including documented procedures, and are extending the consistent approach of the EMS program beyond the EMS fenceline.

As part of the Ports EMS Assistance Project, GETF conducted a neutral analysis of "off the shelf" software products specifically designed to support an organization's development, implementation, and subsequent management of its EMS. Ports and other EMS implementers often seek such tools to efficiently manage EMS implementation and maintenance tasks, such as project scheduling and management, training and training records, documentation management, and internal auditing and corrective/preventative actions. The results of this 2004 assessment may be found at www.peercenter.net/ewebeditpro/items/O73F4044.pdf.[53] EMS software packages can offer the following benefits to users: better communication between environmental and project staff at multiple installations; easy access to routine environmental and EMS documents and records; access to regulations and other requirements; enhanced management of permits, reporting, and compliance; database query, reporting,

> **Documentation Should Be Available for All EMS Components, Including:**
>
> - Environmental policy
> - Organization chart or lists/tables of key responsibilities
> - Description of how the port satisfies the EMS requirements
> - System-level procedures (e.g., procedures for corrective & preventive action)
> - Activity- or process-specific operational controls (e.g., SOPs, work instructions)
> - Other EMS-related documents (e.g., emergency preparedness & response plans, training plans)
>
> **Records You Might Maintain Include:**
>
> - Legal, regulatory, and other code requirements
> - Results of EA identification
> - Reports of progress towards meeting objectives & targets
> - Permits, licenses, & other approvals
> - Job descriptions & performance evaluations
> - Training records
> - EMS audits and regulatory compliance audit reports
> - Reports of identified nonconformities, corrective action plans, & corrective action tracking data
> - Hazardous materials spill/other incident reports
> - Communications with customers, suppliers, contractors, & other external parties
> - Results of management reviews
> - Sampling & monitoring data
> - Maintenance records
> - Equipment calibration records

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[53] "EMS Software Comparison", March 15, 2004, updated April 21, 2004, & June 23, 2004, accessed March 28, 2007.

and updating; document repositories; enhanced project management; e-mail based notification systems with escalation functions; calendar and EMS milestone and progress functions; EMS report generation tools; and information access security controls.

Enhancements for Sustainability

Strong documentation and records management should be part of any port's BMPs. Documenting broader stewardship efforts in the areas of social responsibility and economic prosperity may require new procedures. Clearly, EMS tracking systems are optimized if they integrate with other management systems, such as a port's financial tracking software.

The recent San Pedro Bay Ports Clean Air Action Plan, approved November 20, 2006, by the Port of Long Beach and the Port of Los Angeles, sets a precedent for documentation.[54] San Pedro Bay is currently in non-attainment with federal air quality standards, and without a comprehensive strategy would never reach attainment given projected growth in container freight through these two ports. The plan sets specific goals and targets, with documentation systems and report backs to stakeholders on all elements of plan implementation. Specific activities include:

- A truck replacement program to phase out all "dirty" diesel trucks from the ports in five years, replaced with a new generation of clean or retrofitted vehicles and driven by people who earn at least the prevailing wage;
- Aggressive milestones with measurable goals for air quality improvements;
- Recommendations to eliminate emissions of ultra-fine particulates;
- A technology advancement program to reduce greenhouse gases (GHG); and
- A public participation process with environmental organizations and the business communities.

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[54] For further information, see the *San Pedro Bay Port Clean Air Action Plan*, the most comprehensive strategy to cut air pollution and reduce health risks ever produced for a global seaport complex, visit: www.portoflosangeles.org/environment_air.htm.

Element 11: Monitor, Measure, Evaluate, and Record Performance

Building on Element 4 where you identified SEAs, your port needs to know what it is monitoring and measuring and to have established a solid

> "What gets measured is what gets done. "
>
> Tom Peters

baseline against which to gauge process. Monitoring and measurement helps you to manage your port better by allowing you to measure environmental performance, analyze root causes of problems, and assess compliance with legal requirements. This element means that your port:

- Monitors operations and activities that can have significant environmental impacts and/or compliance consequences;
- Tracks performance (including your progress in achieving your goals);
- Measures and reports on continuous improvement in environmental performance via the EMS;
- Calibrates and maintains monitoring equipment; and
- Periodically evaluates compliance with applicable laws and regulations through internal audits.

Element 11 in the Field

Ports that have implemented EMSs have reported substantial benefits through systematic monitoring and measurement programs.

Earlier in this primer, Element 5 provided objectives and targets for the Port of New York and New Jersey, including activities around water loss and reduced NOx emission. Adoption of an EMS generated the following quantifiable benefits at the port:

- In 2005, repaired several water leaks that reduced the average daily water loss by 640,000 gallons and saved approximately $655,000 in cost at NJ Marine Terminals. These actions resulted in saving and conserving 134 million gallons of water during 2005 and will contribute to substantial water savings for years to come.

- Signed an agreement with New York City Department of Transportation to retrofit the Staten Island Ferry Fleet and executed contracts in the Marine Vessel Engine

Typical Performance Indicators

Management:
- Training
- Resource allocation
- Purchasing
- Funding

Operational:
- Inputs (quantity of materials processed versus recycled, or energy or water used, etc.)
- Operation & maintenance
- Emergency events & non-routing operations
- Outputs (e.g., waste, emission, noise, heat, light)
- Service provide by activity

Management/operations:
- Safety (e.g., frequency of injuries, seriousness of injuries)
- Customer delivery (e.g., complaints, targets met)
- Production costs
- Sales & price
- Environment (e.g., Notices of Violations)
- Human resources (e.g., training days/employee, turnover rates)
- Financial performance (e.g., earnings before interest & taxes (EBIT), working capital)

Replacement Program that will achieve substantial air quality improvement. Reduction of NOx emissions resulting from these programs could exceed 400 tons per year and exceed that required to meet the General Conformity Requirements for the Harbor Deepening project.

Other measurable benefits identified by ports that participated in the 1st Ports EMS/SMS Assistance Project include the following highlights:[55]

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[55] 1st Ports EMS/SMS Assistance Project, Final Report, May 2006.

- Port of Virginia – Cargo handling equipment purchasing program reduced air emissions by 30% over 3 year period; received AAPA award;
- Port of Portland – Reduced vehicle idling at parking gates by 79%; purchased 5% of marine electric power from sustainable, wind-generating energy sources; and
- Port of Corpus Christi Authority – Through its port-wide recycling program, saved $29K and diverted 143K pounds of waste materials from entering the local landfill; received local environmental conservation and stewardship award.

Ports have also conducted inventories to estimate emissions from mobile sources such as oceangoing vessels, harbor craft, cargo-handling equipment, locomotives, and on-highway vehicles.[56] An inventory provides the baseline from which to create and implement emission mitigation strategies and track performance over time. Not all of the ports that have conducted these inventories have an EMS. However, the ports that do have EMSs in place will be able to systematically use the emissions data to develop, implement, and monitor emissions reduction strategies.

Enhancements for Sustainability

Environmental performance indicators are flexible enough to address indicators of broader sustainability.

- With regard to economic indicators, for example, sustainability looks not only at financial performance but also the port's contribution to the sustainability of the larger economic system (e.g., regional economy). Ports are major economic drivers in their localities; many are accustomed to tracking their market presence and both direct and indirect regional economic impacts.

> "Port Everglades operates in a sensitive environment and in an area that is very dependent on tourist-related dollars. We have to be environmentally proactive. Our EMS is formalizing our practices and establishing an operating philosophy that will sustain itself." — Ken Krauter, Port Director, Port Everglades
>
> Source: EPA, AAPA & GETF. Environmental Management Systems: Systematically Improving your Performance: Ports Sector, September 2004.

- Paying more attention to community concerns is a key attribute of a sustainable port. Through public outreach and communications efforts, ports also focus on their impacts on the communities in which they operate and involve citizens in decisions that affect them. The Ports Corporation of Queensland, Australia, for example, produces an annual Sustainability Report, which highlights its commitment to a sustainability framework covering environmental, social, and economic performance.[57]

- Paying more attention to community concerns is a key attribute of a sustainable port. Through public outreach and communications efforts, ports also focus on their impacts on the communities in which they operate and involve citizens in decisions that affect them. The Ports Corporation of Queensland, Australia, for example, produces an annual Sustainability Report, which highlights its commitment to a sustainability framework covering environmental, social, and economic performance.[58] Similarly, the Port of Houston Authority publishes an annual Environmental Report that presents data on the port's performance in meeting its environmental objectives and targets.[59]

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[56] In January 2006, EPA's Sector Strategies Program released a guide on current methodologies and best practices for preparing port emission inventories. To see the guide, visit: the EPA Sector Strategies website at: http://www.epa.gov/sectors/ports/bp_portemissionsfinal.pdf.

[57] See www.pcq.com.au/downloads/2005_PCQ%20Sustainability_WEB3.pdf, accessed March 30, 2007.

[58] See www.pcq.com.au/downloads/2005_PCQ%20Sustainability_WEB3.pdf, accessed March 30, 2007.

[59] To see the Port of Houston Authority's most recent Environmental Reports, please visit: http://www.portofhouston.com/publicrelations/environment.html.

- Through training, emergency preparedness and response, and other EMS elements, ports may already track a number of potential social indicators associated with labor practices.

Element 12: Conduct Audits and Correct Problems

Through measurement or other activities under Element 11, or through internal audits, you can assess whether your EMS is adequate and verify that your EMS plans are being followed.

Internal auditing is a well-defined process that ensures:

- Problems are identified and investigated;
- Root causes are identified;
- Corrective and preventive actions are assigned and implemented; and
- Actions are tracked and their effectiveness is verified.

Audits are pivotal to maintaining a viable system in the face of accidents, emergencies, changing rules, staff turnover, etc. By identifying and reporting EMS nonconformities and deficiencies to your management, you are able to:

- Maintain management's focus on the environment;
- Reassess, refine, and improve the EMS and its performance, including anticipation and prevention of future problems;
- Ensure the cost effectiveness of the system.

> **Audit Procedures Typically Describe:**
>
> - Audit planning
> - Audit scope
> - Audit frequency
> - Audit methods
> - Key responsibilities for the audits
> - Reporting mechanisms for the audits
> - Recordkeeping for the audit results
>
> **EMS Problems Typically Include:**
>
> - Poor communication
> - Faulty or missing procedures
> - Equipment malfunction or lack of maintenance
> - Lack of training
> - Lack of understanding of requirements
> - Failure to enforce rules
> - Corrective actions that fail to address root causes of problems

Element 12 in the Field

Many ports have developed internal auditing programs as part of their EMSs. EMS Internal Auditor Training at the Port of Los Angeles, for example, had the added benefit of reinforcing the concept that the results of internal audits drive the continual improvement of the EMS and, as a result, improve environmental performance.

Ports such as the Port of New York and New Jersey have used the results of internal audits to improve the effectiveness of their EMS and enhance conformity with ISO 14001 Standard. Several ports have achieved ISO 14001 certification, including the Falcon Terminal at Massport's Port of Boston, and the Barbours Cut Terminal and central maintenance areas at the Port of Houston Authority. Ports worldwide are also meeting this international standard, including the Port of Altamira, Mexico, and the Port of Halifax, Canada. In order to receive ISO certification, organizations must pass audit by an independent third party.

> **ISO 14001 Certification**
>
> An organization can receive certification that its EMS complies with the requirements of the ISO 14001 standard by undergoing an audit from a qualified, independent third party. When deciding whether to have an independent audit of your system, a port should consider whether:
>
> - It is a contractual, regulatory, or market requirement;
> - It meets customer preferences;
> - It is part of a risk management program; or
> - It will motivate your staff by setting a clear goal for the development of the EMS.
>
> Source: International Standards Organization, http://www.iso.org/iso/en/ISOOnline.frontpage, accessed April 24, 2007.

Enhancements for Sustainability

Auditing for broader sustainability measures is an extension of EMS auditing. Ports already conduct or come under financial audits, for example, in compliance with federal, state, and local requirements.

Element 13: Conduct Management Review

Management reviews are critical to continual improvement and ensure the EMS will continue to meet your port's needs over time. A management review answers the question, "Is the system working?" (i.e., is it suitable, adequate, and effective, given the port's needs?).

Your port's top management should review and evaluate your EMS at defined intervals, such as quarterly. While the scope of the review should be comprehensive, not all elements need to be reviewed at once. Review of the policy, goals, and procedures should be carried out by the level of management that defines them. The management review should include:

- Results from assessment, including internal audits, and status of preventive and corrective actions;
- Progress in meeting objectives and targets;
- The continuing suitability of the EMS in relation to changing conditions and information; and
- Concerns of relevant interested parties;
- Follow-up actions from previous management reviews; and
- Recommendations for improvement.

Management involvement ensures that the EMS is integrated not only in the port's day-to-day operations but also into its strategic planning process.

Element 13 in the Field

Ports involve their top management in periodic reviews of EMS projects. The Port of New York and New Jersey, for example, established a Management Review Team comprising nine members who represent top level management: the Directors of Port Commerce Department and the Office of Environmental Policy, Programs & Compliance, Assistant Port Commerce Directors for Operations and Port Planning &

> "One of the greatest benefits of having an EMS comes from the confidence that it provides. We know we are managing our environmental responsibility and lessening the potential of environmental problems." — John P. LaRue, Executive Director, Port of Corpus Christi Authority
>
> Source: EPA, AAPA & GETF. Environmental Management Systems: Systematically Improving your Performance: Ports Sector, September 2004.

Development, Managers for Strategic Support Initiatives, Strategic Analysis and Industry Relations, Regional Programs, and Administration; and the Chief Environmental Engineer. Management reviews demonstrate full commitment to EMS implementation and may assist a port in going on to achieve ISO 14001 certification for its EMS.

Enhancements for Sustainability

Reviewing systems for broader sustainability is an extension of EMS reviews. Such continuous improvement evaluations allow a port to improve its day-to-day operations, activities, and services to achieve all desired objectives and targets. These reviews can also dove-tail with a port's strategic planning. Once a port has established this Plan-Do-Check-Act systems approach, its management and employees are more apt to think more holistically and "outside the box" about solutions to business challenges, e.g., using solar or wind as sources of energy for the port and to sell back to the grid; using porous pavement instead of installing a storm water management system.

Security Management Systems (SMSs) Based on the Plan-Do-Check-Act Model

The Port of Houston Authority, having previously implemented an ISO 14001-certified EMS, successfully tested the use of the Plan-Do-Check-Act framework for managing security risks and vulnerabilities as part of the 1st Ports EMS/SMS Assistance Project. Similar in general structure to an EMS, an SMS helps ports identify vulnerabilities, establish action plans, and ensure continuous monitoring and measuring – all done in coordination with a port's strategic objectives and legal requirements. The following highlights demonstrate how EMS elements can be modified to reflect SMS realities.

- *Plan – Element 1:* With regard to **scope**, the SMS fenceline may be set as all entities over which the port exercises **control** or **significant influence** with regard to operating policies and practices. Thus, in setting boundaries for its SMS, Houston selected its Barbours Cut Container and Cruise terminals as its SMS fenceline, because these facilities were managed by the port's Police/Security Force and were within the port's direct operational control.

- *Plan – Element 5:* Ports have already incorporated security **objectives and targets** into their **action plans**. Houston's SMS program allowed its police department to analyze security risk and other significant vulnerabilities for establishing program goals. By establishing these goals, the port maintained a method for monitoring and tracking successful implementation and completion of security projects.

> "The requirements and demands of port security literally have changed overnight. Using a systems approach allows us to manage the rapidly changing security regulations and deadlines. Today, the approach is helping the Port of Houston identify and prioritize vulnerabilities and risks so that we can make security better, faster." — James T. Edmonds, Chairman, Port of Houston Authority
>
> Source: EPA, AAPA & GETF. Environmental Management Systems: Systematically Improving your Performance: Ports Sector, September 2004.
>
> "We developed a security management system based on ISO 14001: 2004. The Plan-Do-Check-Act model has already verified that we are in compliance with security requirements, and provided us with organizational structure and responsibility for more efficient use of resources. It has also provided an ongoing process to monitor and measure key security parameters, and guided us to reallocate resources to highest security priorities." — Russell Whitmarsh, Chief of Police, Port of Houston Authority
>
> Source: "U.S. Ports Set Sail for ISO/PAS 28000," *ISO* Focus, July/August 2006, http://www.peercenter.net/ewebeditpro/items/O73F9006.pdf.

Security Risk Area	Significant Vulnerability	Objective	Target
Key control	Access control	Develop a key control system at container & cruise terminal	50 percent by June 2006
Vessel stores	Vessel stores & bunkers	Develop a vessel stores communications program	100 percent complete by June 2006
Cargo handling	Cargo handling	Establish an exit process for cargo handling	100 percent complete by June 2006
Security equipment maintenance	Security equipment maintenance	Develop a quality control program for security equipment maintenance	50 percent complete by December 2005
SMS program development	SMS implementation	Implement SMS program for container & cruise terminals	100 percent complete by June 2006

- *Do – Element 6:* **Operational controls** extend to security. The Security and Accountability for Every (SAFE) Port Act of 2006, for example, includes port safety measures that require 100 percent of

imported containers to be scanned for radiation, which will entail the deployment of appropriate monitoring devices, as well as the creation of standards for operating procedures.

- *Do – Element 7:* Re. **emergency preparedness and response** and SMS implementation, the ISO PAS 28000:2005 standard, *Specification for Security Management Systems for the Supply Chain*, specifies the requirements for a security management system, including those aspects critical to security assurance of the supply chain. These aspects include, but are not limited to, financing, manufacturing, information management and the facilities for packing, storing and transferring goods between modes of transport and locations. Security management is linked to many other aspects of business management. These other aspects should be considered directly, where and when they have an impact on security management, including transporting these goods along the supply chain.

- *Do – Element 8:* As part of its SMS, the police department at the port developed a **comprehensive tiered training program**, which was used as a tool to communicate roles and responsibilities, regulatory requirements, and appropriate response actions pertaining to current U.S. Coast Guard Maritime Security (MARSEC) conditions. Using a tiered approach allowed the department to communicate the SMS program to both internal and external stakeholders – expanding into social performance indicators of community involvement.

  o Tier I Competence Training is provided to personnel with police/security duties and discusses the Facility Security Plans (FSPs) in detail, including MARSEC level response actions.

  o Tier II Tenant Security Officers are select tenants that are not incorporated within an FSP. This training is provided to ensure the tenant security representative is aware of the federal regulatory requirements and the port's programs and policies.

  o Tier III General Awareness Training is provided to all Port of Houston Authority employees, contractors, visitors, and vendors. This course provides a general overview of security practices and general MARSEC level awareness.

- *Do – Element 10:* To meet the confidentiality requirements pertaining to the law enforcement documents and records, the police department at the port created a **document management** structure. This written procedure describes the SMS document control/approval process for monitoring newly developed forms, records, and reports.

- *Check-Act – Element 12:* **Auditing** for security considerations is an extension of EMS auditing. For its SMS, for example, the police department at the Port of Houston Authority developed an internal compliance auditing program to ensure regulatory compliance. The department's internal auditing team consists of employees from the port's environmental affairs, engineering, risk management, operations, marine, and port police departments. This diverse team worked together in creating auditing protocols, including a written audit plan, a schedule, a questionnaire, a report and corrective action processes. Additionally, the SMS core team worked together in creating a training program. The internal audit was conducted in July 2005, as a preparation exercise for the external USCG audit. As a result of this audit, Houston successfully completed the external audit and subsequently received noteworthy remarks regarding this proactive management practice.

Additional ports are now developing SMS as part of the 2nd Port EMS/SMS Assistance Project, including the Port of Corpus Christi Authority, the Port of Long Beach, the Port of Portland, and the Port of New York and New Jersey. Results from these efforts will be available in early 2008.

Conclusion

Organizations around the world, both public and private, are facing increasing scrutiny regarding their environmental "footprints". EMSs allow organizations such as ports to systematically and continuously identify, measure, and manage the environmental impacts of their activities. Regulatory compliance is the foundation of an EMS, not the end goal. EMSs help organizations go beyond compliance to become better neighbors and to make their operations more sustainable.

Many business partners in marine transportation are recognizing the value of adopting EMSs. Freight carriers such as Atlantic Container Line, American Presidents Line, Hanjin Shipping Company, Hapag-Lloyd Container Line, K Line Matson Navigation, Mitsui O.S.K Lines, and NYK Group and cruise lines such as Holland America and Royal Caribbean have received ISO 14001 certification for EMSs covering their ships and/or facilities. There is also a very long list of shippers with ISO 14001 certification.

It is critical for ports to work with their business partners and other stakeholders to find sustainable solutions to increasingly complex challenges like climate change, energy, and land use, i.e., to meet today's economic, environmental, and social needs without compromising the ability of future generations to meet theirs.

'We must realize we are no longer unconnected. Our success — all of us in an integrated global supply and demand chain — depends on the success of the whole. The success of the entire world economy and the well-being of all of the world's people depend on our ability to succeed as sustainable businesses at this critical juncture in our industry's history." — Chang Kuo-Cheng, Chairman, Evergreen Marine Corporation

Source: "Evergreen Chairman Urges Cooperation," *Traffic World*, March 6, 2006.

Steering Toward Sustainable Port Communities
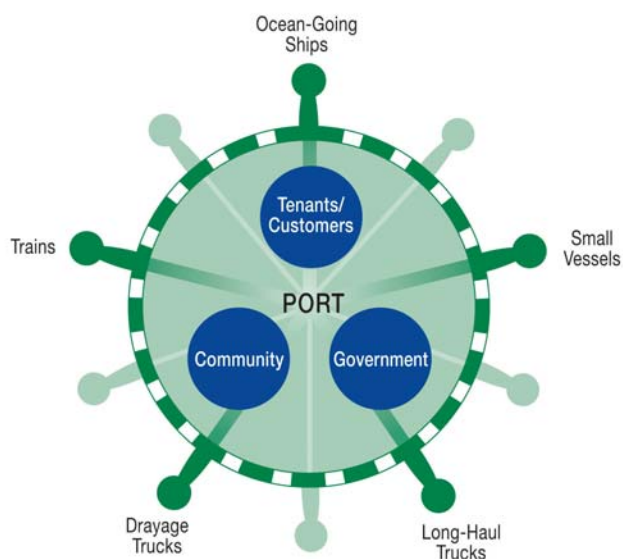
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