

Preamble

To fulfill their mission to be environmental stewards, members of the Association of Pacific Island Ports (APP) together with other ports worldwide have made significant progress toward, and recognize the need to continue to reduce the environmental impacts from port operations. This Environmental Management Handbook is intended to provide ports, their tenants, and other waterfront property owners/operators with practical advice and information on managing environmental issues. The document identifies critical environmental issues and presents cost-effective practices that may be used to reduce impacts.

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The APP wishes to sincerely thank the AAPA for allowing it to adapt its handbook.

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Section 1 Introduction

1.1 Background

Ports around the world are facing increased pressure for development of newer, larger, and more efficient facilities to accommodate increased oceanborne trade carried by larger and larger vessels. Deep draft ports accommodate more than 95 percent by weight, and 75 percent by value, of all overseas trade. In addition, cruise ships and other passenger services are increasingly using commercial port facilities.

These guidelines are generic because all ports are different according to their:

- physical location - topography, climatic conditions etc
- purpose - ship and cargo types, volume, frequency.
- regulatory framework
- socio-cultural aspects

The Environmental Management Handbook assists APP in achieving its goal “To support and assist APP member ports throughout the Pacific Islands Region in the achievement of their economic and transportation purposes in an environmentally sound and responsible manner.”

Ports, by their nature, are in close proximity to highly sensitive resources, and are under increasing scrutiny by the environmental community — both by the regulators and public/private interest groups. Recognizing this increased pressure, the Association of Pacific Island Ports (APP), in consultation with the South Pacific Regional Environment Programme (SPREP), has developed this Environmental Management Handbook (EMH) to assist ports in effectively managing their environmental issues.

1.2 Purpose

The EMH is intended to be used by any port within the region as a guide document for environmental issues relevant to pacific ports. The handbook recognizes that port authorities have varying degrees of control over operations at their facilities (e.g., “landlord” ports may have less control than “public operator” or “private operator” ports, as discussed in greater detail in Section 4). This document provides suggestions on a variety of environmental issues, but is not intended to mandate any specific actions to be taken by a port or its tenants. While this document has an emphasis on “landlord” ports, the APP and SPREP believes that this document will be valuable to any type of port, regardless of its operating approach. The EMH has two primary goals:

- Provide general guidance on environmental management practices — both for the port and its tenants — designed to protect and enhance the environment. The EMH focuses on day-to-day environmental issues, and

does not cover infrequent catastrophic events such as major fuel spills or ship collisions. (This needs its own stand alone guidelines)

- Provide a framework for incorporation of environmentally sound practices into a port's management procedures and structure.

The underlying objectives as defined by the APP and SPREP are to:

- Identify key environmental considerations to be addressed by port managers.
- Identify cost-effective management practices specific to each environmental consideration.
- Develop a framework to incorporate environmental practices in a port's decision-making process.
- Assist in the development of outreach and education programs.
- Provide guidelines for organizing environmental staff within a port.

1.3 Contents of the Environmental Management Handbook

To meet these goals and objectives, this document includes the following sections, in addition to this introduction.

- Section 2 - Environmental Considerations for Port Development and Operations. This section provides a brief summary of the environmental considerations related to port operations. It also describes port- and tenant-operations and activities that may warrant attention in an environmental management program intended to protect and enhance the environment.
- Section 3 - Port Environmental Management Practices¹. This section identifies and describes environmental management practices designed to minimize risks associated with the activities identified in Section 2.
- Section 4 - Port Environmental Management Tools. This section provides guidance on lease management, compliance auditing, and environmental awareness training.
- Section 5 - Public Outreach. This section provides guidance and case studies on both public relations and public consensus-building approaches.
- Section 6 - Framework for Implementing an Environmental Management Program. This section provides assistance on incorporating environmental management into a port organization.

¹

The term "Environmental Management Practices" is used in this document to represent a common sense measure, used on a voluntary basis, associated with a particular activity at a port to protect and enhance the environment.

Section 2

Environmental Considerations for Port Development and Operations

The purpose of this section is to identify port development and operation activities that may affect environmental quality. For each activity, the potential pathways for environmental impacts are also evaluated.

2.1 Port Activities

Activities and operations vary widely among ports depending on the types and volume of materials shipped. However, there are many common activities, such as vehicle maintenance or bulk materials handling that occur at nearly every port, and impacts to the environment from these activities may occur. For example, fuel spills of varying amounts that occur during routine on- or off-loading activities can be carried by stormwater into a water body, and can have serious effects on water quality, waterfowl, and sediments.

However, a port can play a significant role in protecting and enhancing the environment through careful initial planning and implementation of appropriate measures. The degree to which a particular activity may impact the environment is dependent on:

- Proximity to sensitive natural resources
- Open pathways between the activity and these resources
- Extent of the activity
- Controls in place to prevent or reduce impacts
- Opportunities to enhance the environment

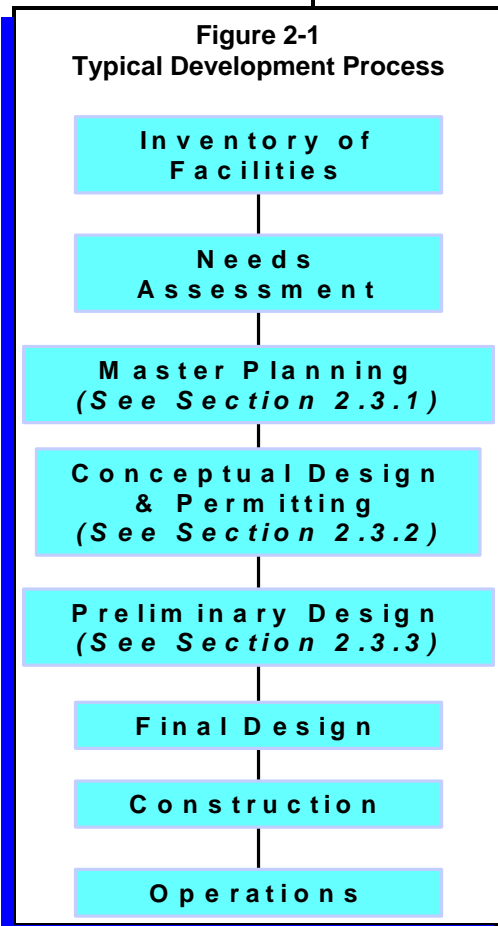
This section presents a list of key port activities that have potential to affect environmental quality, divided into two main categories:

- Development-related activities
- Operations-related activities

For the purpose of this document, development-related activities include construction, and operations-related activities include maintenance. The following section presents activities in each major heading. Activities that are both development and operations-related are discussed in the most appropriate section.

2.1.1 Development-Related Activities

Figure 2-1 shows a typical development process, starting with an inventory of current facilities and needs assessment, followed by master planning, several stages of design, construction, and finally into startup and operations. While environmental impacts are most



likely to occur during construction and operations, environmental concerns may arise at any step of the development process, and are best addressed during the earliest possible stages. In particular, environmental issues and concerns are often identified during the needs assessment, and addressed (i.e., potential solutions are found) during the master planning step.

Table 2-1 presents a list of the key construction activities that may be of greatest concern for port development. Section 3 presents a variety of environmental management practices (EMPs) designed to reduce or eliminate the impacts from these activities.

Table 2-1
Development Related Activities

- Building Demolition
- Building Renovation
- Bulkhead Renovation & Installation
- Remediation
- Dredge Material Placement
- Dredging
- Landfilling
- New Building Construction
- Pier Construction / Rehabilitation
- Pavement Installation
- Pavement Removal
- Site Cleaning
- Utility Construction

2.1.2 Operation-Related Activities

Table 2-2
Operations Related Activities

- Automobile Transport
- Building/Grounds Maintenance
- Cargo Handling
- Chemical Storage and Handling
- Fueling
- Painting
- Paint Stripping
- Public Access & Recreation
- Rail Maintenance
- Ship Liquid Discharges
- Ship Air Emissions
- Ship Breaking
- Vehicle & Equipment Maintenance
- Vessel Repair & Maintenance

Table 2-2 presents a list of operational activities that are common to most port facilities. This list was developed through discussions between the APP/SPREP and a series of site visits to ports throughout the region. Section 3 also presents EMPs designed to reduce impacts associated with operational activities.

2.2 Potential Environmental Impacts and Pathways

In general, impacts to the environment occur through four media — air, surface water, soils, and groundwater. For many port activities, there is more than one pathway leading to an environmental impact and each should be reduced or eliminated. For example, for dry bulk storage of metal ore, dusts may be created and carried by wind currents offsite to nearby residences. Stormwater may fall on the product and carry fine particles and other contaminants to nearby surface waters, or the stormwater may dissolve contaminants and carry those contaminants into the soils and eventually into groundwater.

Each activity performed by a port and its tenants should be evaluated to determine the potential pathways for contaminants to reach the environment. An understanding of both the contaminants and potential pathways provides a basis to start or change environmental management practices to help eliminate those pathways, which is the focus of Section 3.

2.3 Environmental Concerns for Port Development

Each step of the typical development project — for a port or for any other industry — requires careful consideration of numerous environmental factors including those shown in **Table 2-3**. Three critical steps in the development process shown in **Figure 2-1** are discussed in the following sections.

2.3.1 Master Planning

During the master planning stage, a port must determine the type and extent of activities that will occur at the new facility. It is important to understand all of the processes and procedures used at a facility, not only the final product or service that will be provided. Then the port, working with its tenants if applicable, would develop a plan to protect and enhance the environment, as demonstrated in **Figure 2-2**.

Figure 2-2
Assessment of Potential Impact Pathways From Operational Activities



Table 2-3
Typical Environmental Considerations For Port Development Projects

- Underground Storage Tanks/ Above Ground Storage Tanks (USTs/ASTs)
- Chemical Storage
- Spills & Leaks
- Solid Waste
- Water Resources
- Wetlands
- Cultural Resources
- Air Emissions
- Wastewater Discharges
- Storm Water Discharges
- Construction Impacts
- Fisheries
- Traffic
- Noise
- Endangered Species
- Public Outreach/Access
- Mitigation
- Hazardous Wastes
- Sediment & Erosion Control

Community and regulatory agency outreach is necessary during this stage to assess community concerns, and develop a strategy to address them. This strategy may involve project modifications, such as limits on the size of the project; additions of new project features, such as public awareness opportunities; or voluntary environmental management programs, including energy efficiency initiatives. In addition, this strategy should be developed in conjunction with other elements of the port's management team (e.g., marketing, engineering, financial, legal) to ensure that any project meets the port's mission.

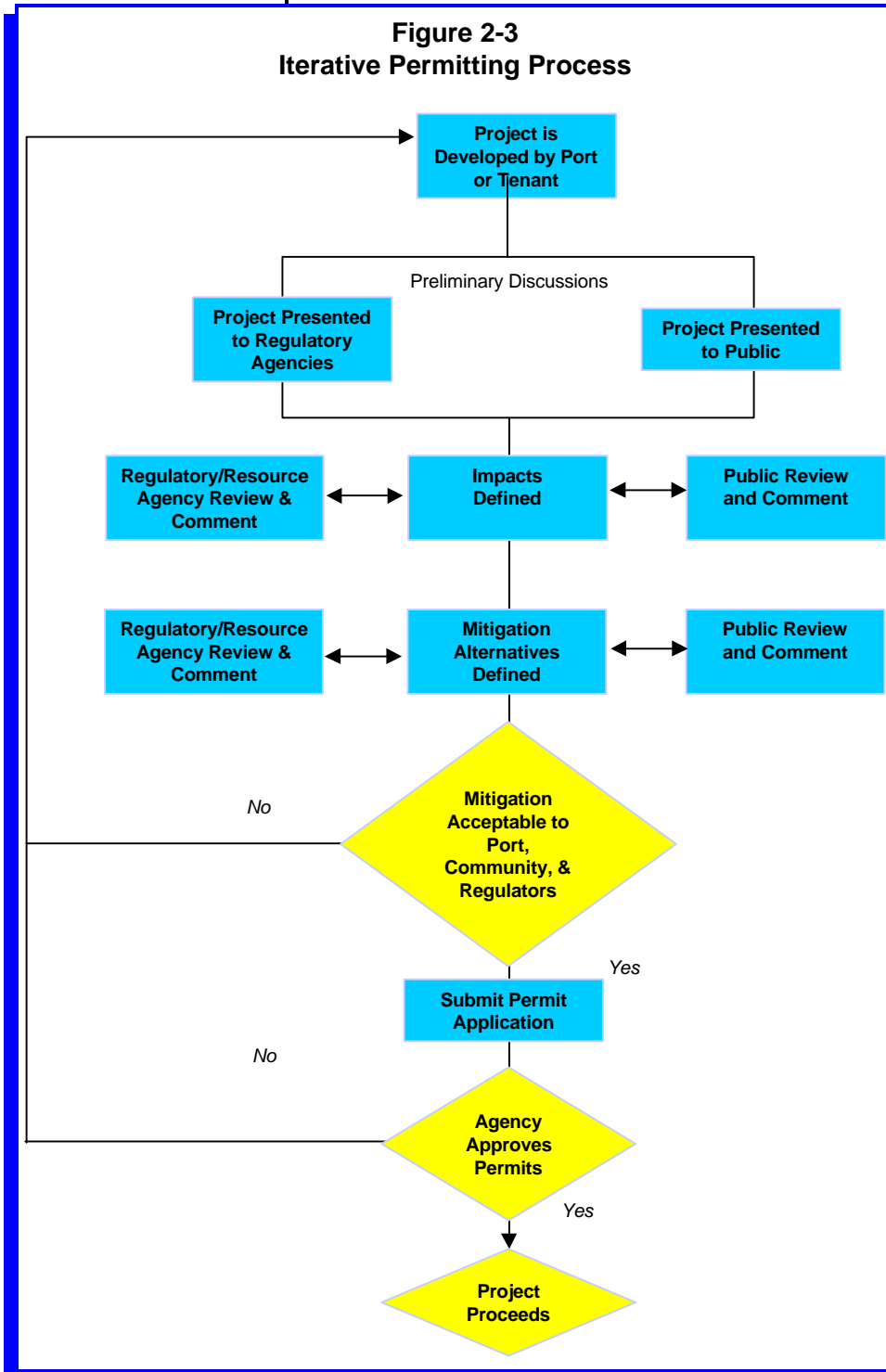
2.3.2 Conceptual Design & Permitting

Once the master plan is complete, conceptual design and permitting efforts are conducted. Permitting is one of the most critical steps in any development project with the extent and number of permits dictated by the respective governments regulatory agencies. Permitting is strongly dependent on the state where development occurs. Where there are no regulatory frameworks in existence it is the responsibility of APP members to follow best practice as advocated by documents such as this handbook.

A typical permitting program, as shown in **Figure 2-3** is an iterative process involving extensive negotiations with local, state, and federal regulatory and resource agencies. There are an extensive number of factors that are weighed by the regulatory agencies during a review of impacts and potential mitigation alternatives, not the least of which are community concerns regarding the project. Many ports prefer to consult with regulatory agencies and the public while projects are still in the conceptual stages to identify potential environmental concerns before costly design plans have been completed. For example, because the permitting process often results in conditions placed on a project's design, a five-step process can be used involving:

- Step 1 - Project Definition
- Step 2 - Preliminary Engineering and Environmental Review
- Step 3 - Permits
- Step 4 - Final Design
- Step 5 - Construction.

In Step 2, a project is brought only to the 30 % complete stage and the Port gathers agency and public comments. In Step 3, permit applications are submitted, and approvals that include conditions on the design and received before final design is started in Step 4.



When agency and public concerns are not well understood, community outreach and involvement programs become essential elements of the project. Section 5 presents a guide for development of community outreach programs and a series of case studies of successful efforts.

2.3.3 Preliminary and Final Design & Construction

Once a plan to minimize the impacts of a development project has been developed, the port/tenant should design the most cost-effective method to eliminate/reduce potential pathways. During the design, the port should also develop plans to minimize the impacts of construction activities — from demolition of existing facilities through construction of new ones. **Table 2-4** presents an overview of the basic development activities of concern and potential pathways and environmental impacts for each activity. Included in the table is a

subjective assessment of the types of impacts — short-term or long-term — to the four media and freshwater and marine biota. This assessment is strongly dependent on the location of the activity and the levels of controls used to protect the environment. However, for the most part, construction-related impacts tend to be more localized, acute in nature (i.e., they occur over a short period of time during construction) and dissipate rapidly at the completion of the project.

	Air Quality		Surface Water Quality		Soils/Sediment		Ground Water Quality		Fresh Water biota		Marine Biota	
	ST	LT	ST	LT	ST	LT	ST	LT	ST	LT	ST	LT
Building Demolition	H	L	H	L	L	L	L	L	M	L	M	L
Building Renovation	M	L	M	L	L	L	L	L	M	L	M	L
Bulkhead Installation	M	L	H	L	L	M	L	L	M	M	M	M
Contamination Remediation	M	L	H	L	L	L	L	L	M	L	M	L
Dredge Material Disposal	M	L	H	M	L	M	L	L	H	M	H	M
Dredging	M	L	M	L	L	M	L	L	H	M	H	M
Landfilling	M	L	M	L	L	L	L	L	M	L	M	L
New Building Construction	M	L	M	L	L	L	L	L	M	L	M	L
Pavement Installation	M	L	L	L	L	L	L	L	M	L	M	L
Pavement Removal	M	L	M	L	L	L	L	L	M	L	M	L
Pier Construction/ Rehabilitation	M	L	M	L	L	M	L	L	M	L	M	L
Site Clearing	M	L	M	L	L	L	L	L	M	L	M	L
Utility Construction	M	L	M	L	L	L	L	L	M	L	M	L

¹ The type and magnitude of impact is dependent on the extent to which an activity occurs, its proximity to sensitive receptors, and the controls employed by the port or its tenants

² ST - Short Term; LT - Long-Term; L-Low impact; M - Moderate impact; H -High impact

2.4 Environmental Concerns for Port Operations

Port operations and activities, by their nature, have the potential to impact one or more environmental media. The port and its tenants should evaluate their operations, determine which pathways and media can be affected and develop plans to eliminate or minimize potential impacts. Environmental compliance audits are generally used to assess port and

Table 2-5
Potential Impacts from Operational Activities^{1, 2}

Activity	Air Quality		Surface Water Quality		Soils/Sediment		Ground Water Quality		Fresh Water Biota		Marine Biota	
	ST	LT	ST	LT	ST	LT	ST	LT	ST	LT	ST	LT
	Automobile Transport											
Off-Loading	H	M	M	L	L	L	L	L	M	L	M	L
Storage	M	L	M	L	L	L	L	L	M	L	M	L
Building Grounds Maintenance/												
	L	L	M	M	M	M	M	M	M	M	M	M
Cargo Handling												
Dry Bulk	H	M	H	L	M	L	L	L	M	M	M	M
Liquid Bulk	M	M	M	L	M	M	M	M	M	M	M	M
General Cargo	L	L	M	L	L	L	L	L	L	L	L	L
Containers	L	L	L	L	L	L	L	L	L	L	L	L
Break Bulk	M	L	M	L	L	L	L	L	M	M	M	M
Chemical Storage and Handling												
	M	M	M	L	M	L	M	L	M	L	M	L
Fueling												
On-Loading	H	M	M	L	M	L	M	L	M	M	M	M
Storage	M	M	M	L	M	M	M	M	L	L	L	L
Off-Loading	M	M	M	L	M	L	M	L	M	M	M	M
Painting												
Building	H	L	L	L	L	L	L	L	L	L	L	L
Anti-Fouling	H	L	M	L	L	L	L	L	M	M	M	M
Service Vehicles	H	L	L	L	L	L	L	L	L	L	L	L
Paint Stripping												
	H	L	M	L	L	L	L	L	M	L	M	L
Public Access & Recreation												
Cruise Lines	M	M	L	L	L	L	L	L	M	L	M	L
Fishing Piers	L	L	M	L	L	L	L	L	L	L	L	L
Moorings/Slips	L	L	M	M	L	L	L	L	M	L	M	L
Public Recreational Access	M	M	M	M	L	L	L	L	M	L	M	L
Rail Maintenance												
	L	L	M	L	M	L	L	L	M	L	M	L
Ship Liquid Discharges												
Ballast Water	L	L	H	L	L	L	L	L	M	M	M	M
Tank Cleaning	M	L	H	L	L	L	L	L	M	L	M	L
Bilge Water	L	L	H	L	L	L	L	L	M	L	M	L
Sewage	L	L	M	L	L	L	L	L	M	L	M	L
Solid Waste												
Ship-Generated	L	L	M	L	L	L	L	L	M	L	M	L
Shore-Generated	L	L	M	L	L	L	L	L	M	L	M	L
Vehicle and Equipment Maintenance												
	H	L	M	L	M	L	M	L	M	L	M	L
Vessel Repair and Maintenance												
	M	M	M	L	M	L	M	L	M	L	M	L
Ship Breaking												
	M	L	M	L	M	L	L	L	M	L	M	L
Ship Air Emissions												
	M	M	L	L	L	L	L	L	L	L	L	L

¹ The type and magnitude of impact is dependent on the extent to which an activity occurs, its proximity to sensitive receptors, and the controls employed by the port or its tenants

² ST - Short Term; LT - Long-Term; L-Low impact; M - Moderate impact; H -High impact

tenant operations and determine which pathways require attention. An audit carefully examines the processes used at a facility, determines the actual or potential impact pathways, and identifies current control methods. From the audit, the port or its tenants can then select appropriate methods to manage the activity more effectively. The audit process is described in greater detail in Section 4.

Table 2-5 presents a summary of major port activities and a subjective assessment of potential impacts from each operation. As discussed previously, this assessment is dependent on:

- **Location.** For example, application of ship paints over land or in a drydock is likely to cause less impact than painting over water (assuming that materials falling in the dry dock are swept up and not discharged.)
- **Sensitivity of Species of Concern.** In areas where highly sensitive species exist, more severe, chronic, and/or acute impacts may occur as compared to an area where less sensitive species exist.
- **Physical Features.** Physical features such as breakwaters may reduce dilution/flushing rates and may cause greater impact, in localized areas, when compared to areas with higher flushing rates.

It should be noted that the impacts described in both Tables 2-4 and 2-5 are site- and project-specific and could vary substantially depending on the implementation process. In addition, the likelihood of impacts is substantially lower when appropriate environmental management techniques are implemented and maintained properly.

2.5 Regulatory Issues

In most countries, environmental rules and regulations are becoming more stringent and are reaching more broadly into private and public sectors. These environmental regulations generally define the potential risks of port operations and most related businesses. This document is intended to provide general environmental guidance to APP member ports, and it would be impossible to define the regulatory programs for each country, state, province, or region. Appendix A provides a guide to retrieving EPA's Section Notebook entitled Profile of the Water Transportation Industry that contains a brief overview of the federal regulatory programs specific to the United States. Readers should refer to their local, regional, state, or federal guidance for the specific interpretation of rules and regulations pertinent to each activity.

Section 3

Port Environmental Management Practices

As environmental regulations become more stringent, and as the pressure mounts to minimize the impact of port development and operations on the surrounding community and natural resources, ports are faced with the task of implementing stronger environmental protection controls. However, ports are also faced with increased competition and pressure from tenants to reduce costs, increase services, and streamline development and expansion. In order to assist members to balance these competing needs, the APP and SPREP identified relevant environmental management practices (EMPs) that are recommended for application by ports operating in the region. EMPs are a new initiative in the region and the recommendations are based on the experiences of ports in the USA, Australia.

This section is intended to stand alone and be separated from the main document for use both by environmental managers and on-site operations coordinators and staff. It is also intended for use both by port staff and tenants alike. It is the intention of the APP and SPREP to review this section at regular intervals, and add to or modify the EMPs based on improvements and new technologies developed within the industry.

The section is divided into two main areas:

- Development-related EMPs. For the most part, these EMPs focus on preventing adverse impacts to environmental media through construction activities.
- Operations-related EMPs. These EMPs are practices or controls placed on operational activities. They are focused on low cost solutions, but in some cases may involve large capital expenditures.

The EMPs cover both source controls and treatment controls where feasible.

3.1 Description of the EMP Format

An environmental management practice (EMP) is any technology, process, operating method, or device that eliminates or controls the release of pollutants to the environment through one or more of the pathways described in Section 2. In developing the EMPs, each activity identified in Section 2 was evaluated to:

- Determine the pathways that lead to impacts to the environment
- Define, in broad terms, the extent of potential environmental impact for each activity
- Identify currently employed EMPs used within the port industry

From this evaluation, EMPs were selected that provide cost-effective methods that focus on eliminating the environmental impact pathways for each activity.

EMPs can be divided into two main categories:



- **Source control EMPs.** These EMPs are operational practices designed to prevent pollutants from entering a pathway and impacting an environmental media. For example, overspray of coal piles is a source control EMP that reduces the emission of particulates during storage and handling activities. Other source controls could include product substitution where less toxic chemicals are used instead of current chemicals.
- **Treatment control EMPs.** Treatment control EMPs remove pollutants after they have entered the pathway but before they impact the environment. For example, an oil/water separator can be considered a treatment control EMP because an oily waste can be discharged from a variety of sources, but is treated before discharge to surface waters or the ground.

The format for the EMPs has been developed to provide a useful and easily understood tool for use by managers as well as field personnel. The EMP format developed for this document, shown in **Figure 3-1**, contains the following information:

1. **Description.** This section provides a brief description and the potential environmental effects of the activity.
2. **Potential Pollutants.** This part identifies the type of pollutants, e.g., hydrocarbons in the form of fuels or oils, that should be targeted for pollution prevention and control. Control measures vary depending on whether the pollutant can be easily separated from or dissolved within a waste stream.

3. **Targeted Activities.** This section defines in more detail the activity covered in the EMP.

Figure 3-1
Representative EMP Format

Environmental Management Practices	
 EMP No.	Activity: Building and Grounds Maintenance 
Description: ①	Potential Pollutants: ②
Targeted Activities: ③	Target Environmental Media: ⑤
Development EMPs/Operational EMPs ⑥ ⑦	US Regulatory Requirements & Available Guidance ④
Considerations: ⑧	

4. Regulatory Guidance. This presents the references to guidance documents available from international, national and industry organization sources. Where applicable it contains references to the relevant legal instruments.
5. Target Environmental Media. This section summarizes the environmental media that are likely to be affected by the activity.
6. Development EMPs. This section includes practices that should be considered when new facilities or major renovations to existing facilities are considered.
7. Operational EMPs. This section identifies practices that may be used on existing facilities to reduce the impact of current operations.
8. Considerations. This section includes discussions on effectiveness, cost, and the need for staff/tenant training.

3.2 Development EMPs

Since EMPs are, by their nature, intended to be specific to an individual or group

of activities, this section only focuses on the construction-related aspects of development projects and the following section focuses on operations issues. Construction projects at ports range from demolition of existing facilities, and rehabilitation of structures such as buildings and bulkheads, to construction of new buildings, paved areas and rail yards as well as dredging and dredged material disposal. Each major construction project has a wide range of construction “activities” such as building/surface demolition, site grading, and new construction. The number of possible pollutants and impact pathways can be extensive for even the smallest project. Thus, this section focuses on identifying potential pathways and utilizing proven and cost-effective construction EMPs for the most common construction projects and activities. At the end of this section are references for additional resources related to construction EMP development.

3.2.1 Identification and Implementation of Construction EMPs

Identification of construction EMPs early in the planning and design stages of a development project is essential, and final design plans should include specific EMPs to cover all activities. Throughout the course of construction, EMPs should be inspected and their effectiveness evaluated to ensure that the environment is protected. **Figure 3-2** presents a suggested approach for selecting and implementing construction EMPs. **Table 3-1** presents a guide for the selection of EMPs for construction and operations activities.

**Figure 3-2
Development EMP Selection and
Implementation Process**

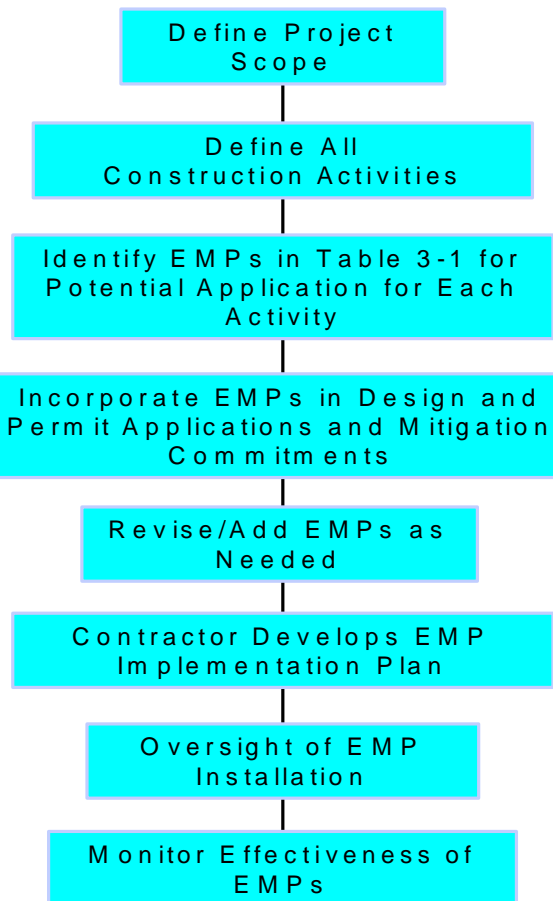


Table 3-1
Guide to Selection of Environmental Management Practices

Activity	Environmental Management Practices																	
	D-1	D-2	D-3	O-1	O-2	O-3	O-4	O-5	O-6	O-7	O-8	O-9	O-10	O-11	O-12	O-13	O-14	O-15
Construction																		
- Building Demolition		•						•	•	•				•	•			
- Building Renovation	•	•						•	•	•				•	•			
- Bulkhead Installation	•		•					•	•	•		•		•	•			
- Contamination Remediation	•							•	•	•				•	•			
- Dredge Material Disposal								•	•	•		•		•	•	•	•	
- Dredging								•	•	•		•		•	•	•	•	
- Landfilling	•							•	•	•				•	•			
- New Building Construction	•							•	•	•				•	•			
- Pavement Installation	•							•	•	•				•	•			
- Pavement Removal	•							•	•	•				•	•			
- Pier & Dock Construction	•		•					•	•	•		•		•	•			
- Site Cleaning	•							•	•	•				•	•			
- Utility Construction	•							•	•	•				•	•			
Operations																		
Automobile Transport																		
- Offloading				•	•				•					•				
- Storage				•	•				•					•	•			
Building and Grounds Maintenance/Landscaping	•	•			•				•	•	•	•		•	•			
Cargo Handling																		
- Dry Bulk						•												•
- Liquid Bulk							•		•	•								•
- General Cargo						•			•	•								•
- Containers						•			•	•								•
- Breakbulk						•			•	•								•
Chemical Storage and Handling								•	•	•								
Fueling																		
- On-Loading								•		•								
- Storage								•		•								
- Off-Loading								•		•								
Painting																		
- Building					•				•									
- Anti-Fouling									•	•								
- Service Vehicles									•	•								
Paint Stripping									•	•							•	•
Public Access and Recreation																		
- Cruise Lines									•	•	•		•	•			•	•
- Fishing Piers									•	•	•		•	•			•	•
- Moorings/Slings									•	•	•		•	•			•	•
- Public Recreational Access	•								•	•	•		•	•			•	•
Rail Maintenance	•	•	•		•				•	•				•	•			
Ship liquid discharges																		
- Ballast Water									•			•	•		•		•	
- Tank Cleaning									•			•	•		•		•	
- Bilge Water									•			•	•		•		•	
- Sewage									•			•	•		•		•	
Solid Waste																		
- Ship-Generated												•	•					
- Shore-Generated												•	•					
Vehicle and Equipment Maintenance									•	•	•		•	•		•	•	
Vessel Repair and Maintenance		•							•	•	•		•	•		•	•	
Ship Breaking		•							•	•	•		•	•				•

3.2.2 Other Available Construction EMP Documents

EMPs for construction activities have been developed and implemented at many transportation facilities around the world. Three useful guidelines related to construction EMPs include:

- Storm Water Management for Construction Activities - Developing Pollution Prevention Plans and Best Management Practices. Developed by EPA, 1992
- Strategy to Protect the Marine Environment: Best Practice Guidelines for Waste Reception Facilities at Ports, Marinas and Boat Harbours, 1993 - ANZECC

- Comprehensive Manual on Port Reception Facilities (1999) and the Guidelines for Ensuring Adequacy of Port Waste Reception Facilities (2000) - International maritime Organization

3.2.3 Construction EMPs

Three construction EMPs are presented on the following pages including:

- Sediment and erosion control - D-1
- Building renovation and demolition - D-2
- Bulkhead, pier, and dock construction - D-3

3.3 Operations EMPs

Operations EMPs address daily port operations and activities that may affect the environment. These activities range from management of bulk liquid and dry storage to routine vehicle maintenance. The key to successfully reducing or eliminating pollutants from daily port operations entering the environment is proper implementation of EMPs. This section covers nearly all common port operations with three notable exceptions: catastrophic fuel spills, bilge water management, and ballast water management. Catastrophic fuel spills are infrequent and can be covered in a port's contingency plan. Bilge and ballast water discharges are covered by the MARPOL convention and IMO's Voluntary guidelines. The APP and SPREP will continue to review developments in each of these areas and consider their incorporation at a future date. To ensure effective implementation of EMPs, ports should:

- Properly train personnel responsible for implementation, as discussed in Section 4.
- Make environmental consideration an integral part of the port's decision-making process (including development and expansion), as discussed in Section 6.
- Include environmental policies concerning EMPs in leases and contracts, as discussed in Section 4.
- Include elements of these EMPs in maintenance work orders. When a port uses a computerized work order system for their maintenance staff, elements of the EMPs could be printed on the individual work order as a reminder for staff.
- Periodically review port operations where EMPs are implemented, as discussed in Section 4.

3.3.1 Environmental Monitoring

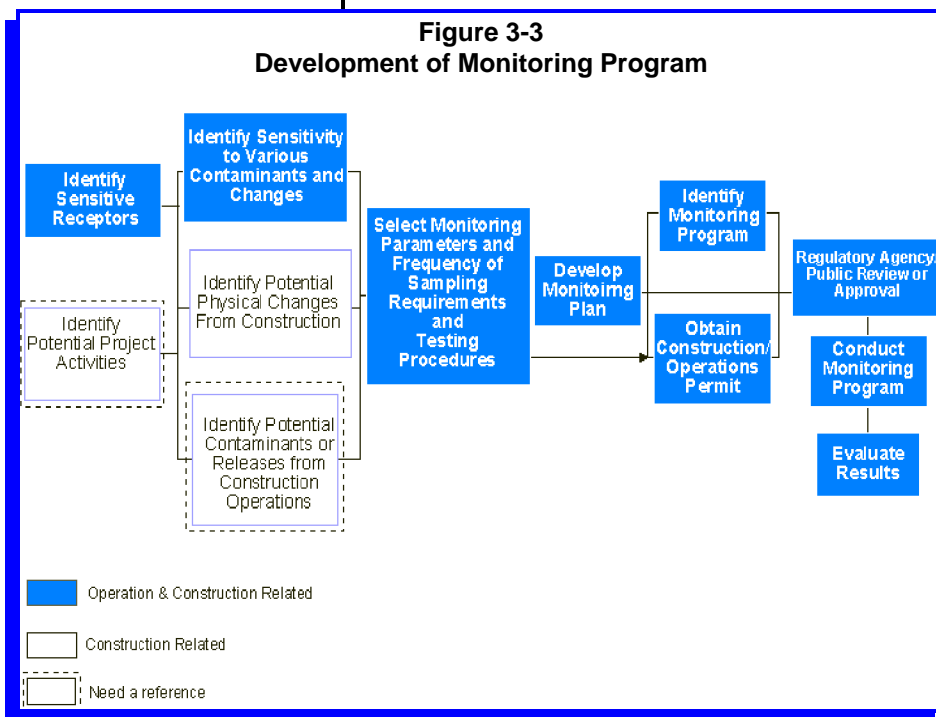
One of the central aspects of EMP implementation is monitoring their effectiveness in reducing/eliminating environmental impacts. Following is a discussion on developing and implementing a monitoring program designed to assess the ability of EMPs to protect the environment, and to select new or improve existing EMPs, as necessary. Monitoring involves the collection of data, including visual characteristics, odors, chemical quality, and biological characteristics of uplands or waterways. Typically, monitoring is conducted

after a construction activity or an operation is brought on-line to determine the long-term impacts to the surrounding environment. However, pre-construction/operations monitoring can also be conducted to assess the baseline conditions of the study area.

Pre- and post-construction/operations monitoring is used to select controls or EMPs that will prevent or reduce the degree of impact, and later to assess the actual impacts resulting in improvements in, or selection of, new EMPs. The type and extent of the monitoring program is dependent on:

- Types of potential contaminants that may be discharged during or after construction.
- The species and/or habitats of concern in the surrounding environment. (This information may be obtained from Environmental, or local and state regulatory agencies.) This may relate to the season when monitoring is necessary and the substances a species may be sensitive to (e.g., fuels, metals, air emissions, etc.)
- The pathway that carries the pollutant to a sensitive species.
- Atmospheric conditions.
- Geologic and geographic conditions.
- Public concern.
- Regulatory requirements.
- Mitigation commitments.

Figure 3-3 presents an overview of the process generally used to select a monitoring program. Pre-construction/operations monitoring programs generally require substantial forethought and careful planning including:



- Identification of Potential Project Activities. If a project is expected in the future, the types of activities and the potential discharges to the air or water should be characterized.
- Identification of Sensitive Receptors. This involves determining the sensitive receptors that may be affected by each activity (e.g., endangered species).
- Identification of Receptor's Sensitivity to Contaminants or Changes. Once the species are identified, research to determine what physical changes and/or emissions/release may impact their habitat life cycle

should be determined. This data may be available in published literature or through local universities.

- **Selection of Monitoring Parameters.** The selection of monitoring parameters is dependent on the species of concern, potential physical changes, types of releases, and known or suspected reaction to these changes.
- **Development of Monitoring Plan.** The monitoring plan should be designed to determine baseline conditions including seasonal and temporal fluctuations, as necessary, and to evaluate reactions to change. The monitoring plan should be discussed with regulatory and resource agencies, as well as the public, to ensure that the results will be acceptable.
- **Implementation of Monitoring Program, Evaluation of Results and Reporting.** Once agreement is reached, the monitoring program would be conducted and the results evaluated on a seasonal, semi-annual, or annual basis. Trends would then be identified and baseline conditions established. The results should be discussed with the regulatory agencies to achieve concurrence.

The value of monitoring is two-fold: to establish a clear understanding of environmental conditions and trends, and to implement and improve upon EMPs that will enhance the environmental quality in the area.

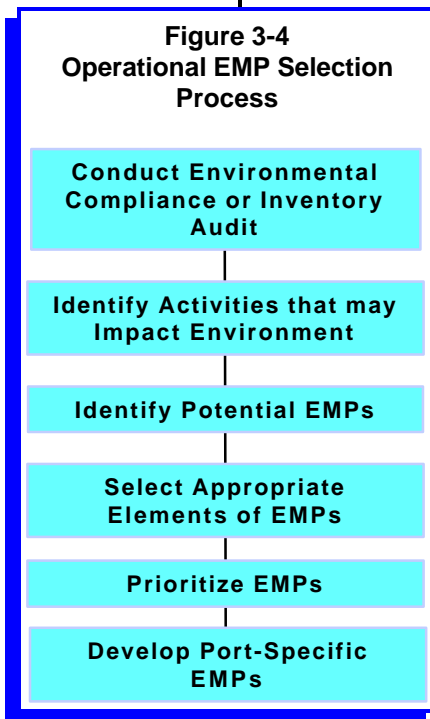
3.3.2 Selection of Operations EMPs

Table 3-1 presented a guide to the selection of operations EMPs. Operational EMPs are generally selected on a port-wide basis and often become part of an overall environmental management program as described in Section 6.

Figure 3-4 presents a summary of the process used to select EMPs and incorporate them into a port's environmental program. First, a port would identify through the use of a compliance or inventory audit, as discussed in Section 4, all of the activities conducted at their facilities as presented along the left-hand columns of Table 3-1. Then the port would identify which EMPs would be applicable to their activities using the 19 EMP columns. The port would then select the most appropriate elements of the EMPs. Finally, the port would prioritize EMP implementation based on a variety of factors including:

- Cost
- Ease of implementation
- Ability to achieve the greatest degree of risk reduction
- Complexity
- Impact on operations

The operations EMPs are presented on the following pages.



Section 4

Port Environmental Management Tools

Port ownership and operation generally falls into three basic categories:

- Operating ports where the port authority itself develops and operates the majority of activities.
- Landlord ports where the port provides basic services and infrastructure and the tenants conduct the majority of activities.
- Combination ports where the port authority may operate some activities and tenant may operate other activities.

Operating ports have direct responsibility for managing those components of its operations that may affect the environment. As a result, such ports should develop and implement environmental management systems and employee training unique to their operations. Landlord ports are in a somewhat different situation since they generally do not have direct control over the activities of their tenants. Nevertheless, landlord ports have a significant stake in their tenants' activities and the effects of those activities on the environment, current approaches to environmental law advocates dual owner/operator liability for environmental contamination. As the economic engines and focal point of many communities, it is important for the ports to maintain a good public image as stewards for the environment.

This section focuses primarily on the following.

- Port-Tenant responsibilities for landlord ports (See Section 4.1)
- Lease management for landlord ports (See Section 4.2)
- Environmental audits and site assessments for landlord and operating ports (See Section 4.3)
- Environmental awareness training for landlord and operating ports. (See Section 4.4)

4.1 Port and Tenant Responsibilities

Landlord ports face a unique environmental compliance situation — the majority of activities that could affect environmental quality are likely to be conducted by tenants. Understanding the types of activities conducted at ports and who is responsible for them is the first step in developing an effective risk management approach.

As the landlord or owner, some environmental laws impose some degree of responsibility for its tenants' actions on the port. Public ports have the additional real or perceived responsibility to protect the surrounding public and to ensure operations are conducted in accordance with local, regional, state and federal laws and regulations. With increasing interest from local communities and private groups in protecting the public and natural resources, ports are faced with greater challenges to reduce the real or perceived affects of the operations of their tenants.

4.1.1 Role of the Port

The relationship between a port and its tenants varies dramatically around the world. The traditional landlord-tenant relationship involves the landlord providing the basic infrastructure — land, utilities and perhaps, buildings in which to operate, and the tenant conducts its operations with limited contact with the landlord. Until recently, many ports have perceived that this relationship limits or absolves the landlord of many responsibilities, including environmental liabilities, because the landlord believes that it has little or no control over the tenant's activities. This delineation of responsibility between the port and its tenants is not always clear.

Typically, the role of the public port authority is to provide safe and efficient space and services to allow easy transfer of materials and passengers. At landlord ports, tenants conduct the majority of activities. Tenants generally lease land from the port and either lease or build/own their buildings and facilities. Their activities vary widely from port to port and may or may not have direct maritime applications or needs. As separate business entities, tenants have the primary responsibility to ensure that their activities meet — not necessarily exceed — environmental regulatory requirements. In many cases, tenants do not fully understand or are not financially capable of meeting their environmental obligations. Ports are often in a position to assist their tenants in understanding those obligations and meeting increasingly stringent environmental requirements.

4.1.2 Defining Roles and Responsibilities

To better manage environmental risks, it is essential to understand and deal effectively with port-tenant relationships. Each port has a different tenant mix — numbers and types of tenants — depending on the markets it serves. Competition among ports for tenants is increasing, placing greater pressure on ports to add incentives to retain or attract tenants. In some cases, those incentives may involve the assumption by the port of additional environmental risks or responsibilities that might otherwise be assumed by the tenant. Public pressure may also require the port to provide additional infrastructure to address environmental issues. Each port must determine the level of risk and responsibility it is willing to accept, and then develop environmental policies and programs designed to minimize those risks.

A number of mechanisms serve to define the responsibilities of tenants and a port. They include:

- **Leases.** A lease is a legally binding contract that defines the terms of the relationship between a port and its tenants.
- **Port Rules and Procedures.** Port rules and procedures are generally requirements and guidelines developed either by the port authority or jointly with tenants. The rules and procedures are incorporated into tenant leases.
- **Environmental Laws and Regulations.** Environmental laws and regulations vary widely in their definitions of responsibility. Some laws have a broad scope and may impose liability or responsibility on the parties that operated

or owned a particular facility for environmental contamination that occurred during the life of the facility; others specifically define the responsibilities of facility owners and operators.

- Community and Political Forces. Regardless of how a law, regulation, or lease is written, the political climate in a particular area may dictate how the community views a port's responsibility for environmental protection. Because a port is often a public entity, communities frequently believe the port is ultimately responsible for the actions of its tenants.
- Economic Factors. Because the port industry is extremely competitive, economic factors can shape the roles and responsibilities of tenants and landlords. In many cases, ports will assume additional responsibilities and risks of its tenants to entice them to remain or to move from a competing port.

Ports must weigh the community and political forces and balance them against the costs of taking on environmental responsibilities and risks, while affording efficient operations for its tenants.

4.2 Lease Management

Over the last 15 years, income from leasing port facilities has grown from a very small percentage of revenue to represent a majority of the total income at some ports. Leasing began primarily as a means for ports to establish long-term relationships with carriers to ensure a firm cash flow and a sound basis upon which to issue bonds for large scale development, such as container terminal facilities.

For the most part, ports develop leases to meet their unique competitive needs. Therefore, no industry "standard" tenant lease exists. A number of factors enter into the development of a lease, including:

- Pricing to ensure that the port receives its "fair share" of revenue
- Long-term development goals and objectives
- Risks associated with inflation and changes in trading patterns and markets
- Competition with other ports
- Needed revenues to improve port facilities

An important, but often overlooked factor, is allocation of environmental risk and responsibility. The cost of remediation of environmental contamination caused by tenant activities or by the port's own operations can have serious consequences on the profitability of a port. Thus, a port operator must also consider environmental risk management when negotiating leases. A balance between all of these factors — profit, competition, and environmental risks — needs to be made during lease negotiations.

4.2.1 Environmental Considerations in Lease Negotiations

In 1996, the American Association of Airport Executives prepared a document

entitled Tenant Environmental Liability Handbook (www.airportnet.org). This document was intended to provide guidance on the inclusion of lease language that would help manage an airport's environmental risks associated with the actions of its tenants. The same guidance may be useful to the ports in identifying the types of language that may be included in a lease to protect the port from the action of its tenants, as described in **Table 4-1**. Examples of the first nine types of provisions include:

**Table 4-1
Typical Environmental
Considerations for Leases**

- Requirements to comply with environmental laws
- Right of entry
- Indemnification
- Review of environmental documents
- Environmental noncompliance
- Duty to notify
- Termination
- Restoration and surrender of property
- Establishing an environmental baseline
- Environmental escrow accounts
- Environmental liability insurance
- Cost

- Requirements to comply with environmental laws (and agreements with regulatory agencies.) This section may include a listing of the environmental laws and definitions of terms. It is important that this list be broad and inclusive to ensure that it covers all applicable federal, state and local requirements, such as environmental cooperation agreements, pollution prevention plans and other voluntary programs the port adopts.
- Right of Entry. This provides the port with the ability to enter a leasehold and conduct inspections related to environmental issues. Ports should ensure that such provisions do not place the responsibility of monitoring or ensuring the tenants' environmental compliance on the port. Moreover, the discovery of some environmental deficiencies could trigger legal reporting requirements on the part of the port or the tenant.

- Indemnification. Indemnification language may provide a port with some protection from liabilities (or costs) resulting from environmental contamination caused by a tenant and may allow a port to obtain restitution from the tenant. Indemnities must be clear and should specify their coverage of environmental liabilities. Ports should understand, however, that indemnities are only as good as the indemnitor. Thus, if a tenant has limited resources, the benefit of the indemnity may be limited. Similarly, indemnity provisions may not protect the port from direct liability from a government action. Government and other parties may still be able to sue and recover damages from the port.
- Review of Environmental Documents. Such a provision would allow the port to review all environmental documents such as permits and industry registrations, particularly those that are submitted to regulatory agencies, to ensure that tenant activities are consistent with the port's environmental goals, practices and procedures. A port should include a statement that the "right-to-review" such documents does not imply that the port accepts any responsibility for the completeness, accuracy, or legal compliance for the tenants.
- Environmental Remediation. Such provisions would require a tenant to remediate contamination according to port and regulatory agency guidelines or allow a port to remediate environmental damage caused by the tenant and charge the tenant for the costs of remediation. It may also allow the port to stop a tenant's operations if contamination continues or until remediation

is completed. In crafting such a provision, a port must balance its desire to remediate environmental damage quickly with the potential risk that it may be exposing itself to additional risks of liability if the remediation is done improperly. Moreover, a port must take care to protect itself from claims that it exacerbated the problem.

- Duty to Notify. Such a provision would require a tenant to notify the port in the event that a release occurs. This notice may not supplant notices to regulatory authorities.
- Termination. Such a provision would allow a port to terminate a lease if the tenant refuses to clean up releases that it caused, or otherwise fails to comply with port environmental goals. Some measures should be included to permit the port to recover costs associated with environmental contamination or to remedy any violations caused by the tenant.
- Restoration and Surrender of Property. Such a provision would require the tenant to return the property to its original condition before the lease is terminated. This may require remediation of releases and/or removal of items such as underground storage tanks.
- Establishing an Environmental Baseline. Such a provision would require the port and tenant to participate in and cooperate during the performance of an environmental site assessment (ESA) prior to the effective date of the lease to establish the environmental standards (conditions) the tenant will be held to throughout the lease. It would also serve to protect the port from claims that contamination found at the end of the lease was caused by prior activities.

Review of documents does not impart responsibility for the tenants activities to the Port.

A port has many opportunities to incorporate this language into leases including:

- New leases for existing or new tenants. Many ports have created standard lease agreements that now include many of the recommendations noted above.
- Lease modifications. In many cases, a tenant will require a lease modification to expand or change its operations. The port then has the opportunity to add protective language as part of the negotiations.
- Lease renewal. When a lease is up for renewal, a port has an opportunity to add appropriate language.
- Lease modification in exchange for a service or more favorable lease terms. Often, a port has the opportunity to include language to improve environmental risk management in exchange for providing additional services or modifying lease rates. This is often a balance between a port's revenue and its desire to address environmental risks.

The decision whether and how many environmental provisions are put into a lease is often driven more by competitive factors than by the port's desire to manage environmental risks. A balance between revenue and environmental risks should be evaluated in any lease negotiations.

4.3 Environmental Compliance Auditing and Environmental Site Assessments (ESAs)

As a result of increased environmental regulation and federal, state and local enforcement, the costs associated with noncompliance and remediation have risen dramatically. Environmental compliance audits and ESAs have become important management tools. An environmental compliance audit offers a unique opportunity to assess the compliance status of a facility or its operations. It is a management tool to provide a “snap shot” of an operation’s compliance with federal, state and local environmental laws and regulations. The compliance audit can be as broad or as narrow as is warranted by the port’s goals. It can be limited to a single operation or compliance with specific regulatory programs, such as air pollution or water pollution control programs, or it can be a port-wide multimedia audit. The audit forms the foundation of a comprehensive environmental management program, allowing a port the opportunity to develop specific programs or procedures designed to eliminate potential impacts from tenant or port operations.

An ESA provides historical documentation designed to identify environmental conditions of a site at a point in time. It can serve as a baseline for the tenant and port in assessing and assigning environmental risks and responsibilities.

This section presents an overview of the positive and negative aspects of conducting an audit, and the typical audit and ESA processes. While much of the discussion in this section has focused on landlord ports, an environmental audit may also be conducted at operating ports as well.

4.3.1 *Pros and Cons of Conducting an Audit*

Considerable debate has occurred about whether to conduct an audit. One viewpoint asserts that conducting an audit identifies problems that may not be discovered by other means and, thus, may impose a duty to report to regulatory officials or take action. In addition, conducting audits of a tenant’s operations may make the port legally responsible for the tenant activities (this depends in part upon how active the port becomes in the environmental management of the tenant).

Another viewpoint states that in the port as the landlord already has some real or perceived responsibility for its tenants’ activities and may not increase its risks if the audit process is carefully managed. Moreover, an undiscovered environmental problem can become more critical over time. Thus, if a compliance audit is carefully managed and if compliance problems are promptly addressed, audits may be useful cooperative environmental risk management tools for ports and tenants.

Self Auditing Protection With budget cutbacks and the resulting reductions in staff available to conduct field inspections, and a renewed emphasis on cooperative environmental compliance efforts, many government entities have seen the benefit of allowing facilities to self-police their environmental compliance.

Some countries have enacted voluntary environmental compliance auditing laws that provide various protections to businesses/facilities from the imposition of criminal, and sometimes civil, penalties for environmental compliance deficiencies discovered in the audit, as shown in **Table 4-2**. Essentially, these laws allow facilities to conduct audits, identify problems, and develop reasonable approaches to remedy those problems, in exchange for reduced or eliminated fines and penalties. Many of those laws also provide for limited protections from disclosure of the information contained in the audits.

While the USEPA encourages self-auditing, it is concerned about the impact of self-auditing on the enforcement of environmental laws.
Enacted State Environmental Audit Privilege and Immunity Laws

STATE	EFFECTIVE DATE	PRIVILEGE	CIVIL IMMUNITY	CRIMINAL IMMUNITY
Alaska	1997	Yes	Yes	No
Arkansas	7/28/95	Yes	No	No
Colorado	6/1/94	Yes	Yes	Yes
Iowa	1998	Yes	Yes	No
Idaho	7/1/95	Yes	Yes	Yes
Illinois	1/24/95	Yes	No	No
Indiana	7/1/95	Yes	No	No
Kansas	7/1/95	Yes	Yes	Yes
Kentucky	7/15/95	Yes	No	No
Michigan	3/18/96	Yes	Yes	No
Minnesota	6/1/95	No	Yes	No
Mississippi	7/1/95	Yes	Yes	Yes
Montana	1997	No	Yes	No
Nebraska	1998	Yes	No	No
Nevada	1997	Yes	Yes	Yes
New Hampshire	7/1/96	Yes	Yes	Yes
Ohio	3/13/97	Yes	Yes	No
Oregon	11/4/97	Yes	No	No
Rhode Island	1997	Yes	Yes	Yes
South Carolina	6/4/96	Yes	Yes	No
South Dakota	7/1/96	No	Yes	Yes

STATE	EFFECTIVE DATE	PRIVILEGE	CIVIL IMMUNITY	CRIMINAL IMMUNITY
Texas	5/23/95	Yes (no criminal)	Yes	No
Utah	3/20/95	Yes (civil only)	Yes	No
Virginia	7/1/95	Yes	Yes	No
Wyoming	7/1/95	Yes	Yes	No

protections provided by some states will hamper enforcement efforts. In 1996, the USEPA issued a directive indicating that the Agency might increase enforcement activities with businesses/facilities in states with self-audit laws. Thus, despite state protections, federal enforcement actions are not affected. A copy of the USEPA guidance is provided in Appendix C.

In deciding when an audit is necessary, ports should consider the following factors:

- Magnitude of potential environmental effects of an operation.
- Resources, including staff, made available to conduct and follow through on the audit results.
- The level of regulatory or public scrutiny applied to the port or a particular activity, including the anticipation of agency actions.
- Complaints, suspected breaches of environmental regulations, or apparent adverse trends in environmental quality.
- Changes in regulatory requirements or emerging environmental issues.
- Concerns of cumulative impacts or risks from multiple operations.
- The end of a lease period when a port may be left with potential liabilities from a tenant's activities.

The following sections present the most common types of audits and the basic audit process.

4.3.2 Types of Environmental Audits

The complexity and scope of an environmental audit varies according to the need or underlying reason for the audit. For example, one audit may be focused simply on the identification and inventory of potential environmental liabilities such as underground storage tanks, while another may focus on the identification of potential sources of known groundwater contamination. In general, audits may be divided into four distinct categories:

- Inventory. An inventory audit identifies and documents the storage, use and disposal practices related to hazardous materials and wastes, and assesses the potential to discharge pollutants into the environment. During an inventory audit, compliance with environmental regulations may not

necessarily be evaluated.

- **Compliance.** A compliance audit determines a facility’s compliance with environmental regulatory requirements and may be either “directed” - geared to one specific regulation - or “comprehensive” covering all pertinent federal, state or local regulatory programs. While a typical environmental compliance audit may begin with an inventory, the audit is expanded to collect sufficient information to evaluate the compliance status of each activity, and then used to develop an overall environmental compliance program.
- **Systems.** In a systems audit, the port would evaluate its own and possibly its tenants’ current procedures to manage environmental issues. A systems audit would evaluate whether written procedures are in place, how those procedures are implemented, who is responsible for each aspect of environmental management, reporting procedures, and emergency response and safety procedures.

- **Health and Safety.** Health and safety audits (H&S) are conducted to determine the general status of worker health and safety programs. H&S audits focus on major health and safety programs (for the port only), determining whether written documents contain the required program elements and whether the program requirements have been met. Health and safety audits may include the items in **Table 4-3**, but are not discussed further in this document.

**Table 4-3
Health & Safety Audit Components**

- | | |
|-----------------------------------------|--------------------------------------|
| ■ Injury and Illness Prevention Program | ■ Preventive Maintenance |
| ■ Hazard Communication | ■ Walking Surfaces |
| ■ Hearing Conservation Program | ■ Materials Handling and Storage |
| ■ Confined Space Entry Program | ■ Compressed Air Equipment |
| ■ Air Contaminant Program | ■ Hand / Portable Tools |
| ■ Asbestos Contaminant Program | ■ Emergency Response Plan |
| ■ Lead Containment Program | ■ Lockout and Tagout |
| ■ Respiratory Protection Program | ■ Fire Prevention Plan |
| ■ Medical Services and First Aid | ■ Pressurized Vessels |
| ■ Heavy Equipment Operation | ■ Carcinogenic/Teratogenic Materials |
| ■ Electrical Safety | ■ Tunnel Entry Program |

4.3.3 Typical Auditing Process

As noted above, the complexity, scope and type of audit to be performed varies according to

the need or underlying reason for the audit. However, an audit can be divided into three basic phases:

- Pre-audit activities
- On-site activities
- Post-audit activities

Figure 4-1 depicts typical activities in each of the three steps. The following sections provide additional information on each phase.

Step 1 - Pre-Audit Activities

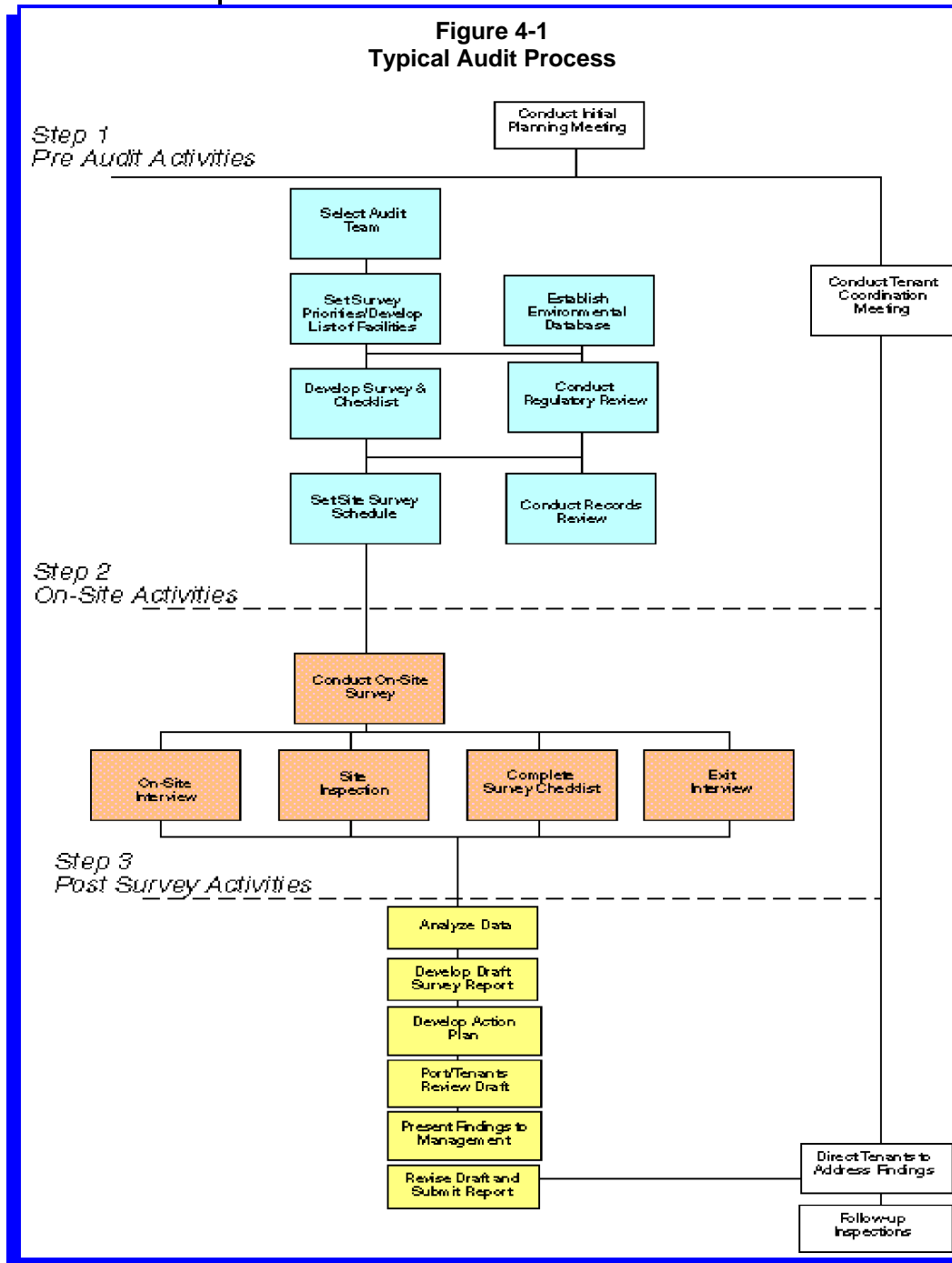
Phase I of an audit focuses on planning, and is an important first step to completing a successful and well-organized program. The planning elements include:

- **Selection of the Audit Team.** This is a critical decision point where the port either uses port staff or selects an independent consultant, or both to conduct the audit. The audit team should comprise technical experts in regulatory

- programs pertinent to the activities conducted by the port and its tenants.
- Port and Tenant Coordination Meeting. This step allows the port to describe

contents, purpose and expected outcome of the audit and provides tenants with the opportunity to ask questions and participate more fully in the process. This step is important to achieve maximum cooperation from the tenants during the audit.

- Set Survey Priorities. For many ports, there are facilities which by their nature have little or no opportunity (pathway) to adversely affect the environment. In addition, there are facilities which by their nature consistently affect the environment. In this step, the port sets priorities for the audit, focusing first on the most significant or high risk operations performed either by the port or its tenants.



- Develop Survey and Inspection Checklists. In this step, a survey form is

created for distribution to the tenants asking them to describe their activities in detail, allowing the port to better focus the audit. In addition, a site inspection checklist is created that ensures that all activities and regulatory programs are covered, and that all tenants are treated equally. An example checklist is presented in **Appendix D**.

- **Establish Environmental Database**. One of the most important methods to maintain long-term compliance at a facility is through the development and constant maintenance of an environmental database. With recent advances in low-cost, highly sophisticated and easy-to-use databases, it is possible to track chemicals stored on-site, permit conditions, registrations, monitoring data, results of compliance audits and many other elements of an environmental program. This database, in turn, allows a port to track carefully the history of environmental compliance and improves programs designed to reduce risks.
- **Conduct Regulatory and Records Review**. These two steps can be accomplished simultaneously and include searching through existing port and regulatory agency records to determine the extent of known environmental issues, and to assess agency concerns related to port activities.
- **Set Site Survey Schedule**. In this step, a detailed schedule for site visits is arranged. This allows tenants to prepare for on-site activities, complete the questionnaire and obtain necessary documentation to allow for easy completion of the audit.

Step 2 - On-Site Activities

There are three main elements of Phase II of an audit:

- **Conduct On-Site Interviews**. The interview generally occurs at the beginning of the inspection where the results of the questionnaire are confirmed and direct questions are posed related to the activities conducted on-site. From the interview, the inspectors would be able to focus their on-site activities to the highest risk areas.
- **Site Inspection**. The site inspection involves a thorough review of the facility confirming the types of activities conducted, the inventory of chemicals, and potential pathways for the activity to affect the environment. The site inspection checklist is used as part of the site visit to ensure that all areas of the audit are completed.
- **Exit Interview**. The exit interview is conducted as soon as possible after completion of the site inspection. During the interview, the key findings of the audit are presented to the tenant, and the tenant is provided with an opportunity to comment on the findings and provide additional information to assist in the audit process.

Data collected during the site inspections may then be entered into the port's environmental database.

Step 3 - Post-Audit Activities

The major components of Phase III are highlighted below.

- Analyze Results. This step involves evaluating all of the data collected during Phases I and II to determine the port's or tenant's environmental compliance status. For each activity, an assessment should be made to determine if effective EMPs are being employed, or if new EMPs are required.
- Develop Action Plan. The action plan defines specific steps that should be taken to improve environmental conditions and could include new systems, additional staff, updated EMPs and many other topics. The action plan also identifies responsibilities, a schedule for implementation, potential costs and impacts on operations.
- Develop Draft and Final Report. During this step, a draft report is developed presenting the results of the entire audit, making recommendations for improvements to individual activities, as well as recommendations for installation of environmental management systems designed to enhance risk management. The draft report is often distributed to the tenants who are allowed to comment on the results and the recommended solutions. Once all comments are received, a final report is prepared and presented to port management. In making recommendations for changes, the port must be careful not to increase the port's risk of being held responsible for the tenant's environmental issues. In some cases, a port may wish simply to provide the tenant with the findings and direct that they be addressed.
- Training. One of the most important elements in maintaining long-term environmental regulatory compliance is training. A more detailed discussion on training is provided below.
- Follow-up Inspections. In order to ensure that findings discussed in the report are addressed, it is recommended that a follow-up inspection program be developed. The follow-up inspections focus mainly on the areas of non-compliance identified above, particularly if a tenant fails to submit compliance documents such as permits, registrations or notices of discharges/releases. However, after a period of a year or more, follow-up inspections could include the elements of a detailed site inspection described above.

4.3.4 Pros and Cons of Conducting ESAs

ESAs are tools that can be used by the port and tenants to assess site conditions and potential environmental risks caused by past and present activities at a site. ESAs are routinely used in real estate and business transactions. For ports, ESAs generally fall into three categories:

- Assessments of currently owned properties located within the Port boundaries either operated by the port or leased to a tenant.
- Assessments related to lease changes either when a lease is modified, a tenant's operations cease, or a tenant is simply leaving the property
- Acquisition of land for expansion

Ports and tenants must recognize and understand that conducting ESAs may trigger certain legal obligations. Under some national jurisdictions, the owner/operator of a facility, and sometimes anyone with knowledge, may have a

duty to report conditions discovered in the course of an assessment to regulatory authorities. Therefore, ports and tenants are encouraged to consult with legal counsel before undertaking an assessment.

4.3.5 Typical ESA Process

An ESA is generally conducted in three phases:

- **Phase I** - Non-intrusive evaluation that includes records reviews and a site inspection with no sampling or drilling. Phase I ESAs are designed to identify areas of potential concern.
- **Phase II** - Physical testing of the areas of concern to confirm or deny the presence of contaminants.
- **Phase III** - Delineation of the extent and magnitude of contamination through extensive sampling and testing.

The typical ESA process is described in the American Society of Testing and Materials (ASTM) Standards entitled E1527-97 Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process and E1903-97 Standard Guide for Environmental Site Assessments: Phase 2 Environmental Site Assessment Process can be obtained through the Internet at <http://WWW.ASTM.ORG>. In addition, some countries may have additional requirements that must be followed to obtain liability protection, and ports should review those requirements applicable to their circumstances.

The typical Phase I & II assessments generally include:

- Historical Review. A historical review including a background check on the facility or site in question. Past and present activities at and around the site, history of releases, spills, and disposal practices should be reviewed, and regulatory records of permits and enforcement activities related to the site should be evaluated to identify the types of activities conducted at the site and potential problem areas.
- Site Inspection. An initial site inspection should be conducted to investigate the site, confirm or deny potential problems noted above, and identify problems not previously found.
- Data Evaluation. Based upon the information gathered from the background check and initial site inspection, a decision can be made regarding the possibility of site contamination and need for a second site inspection involving soil and groundwater analysis.
- Site Investigation (or Phase II Assessment). Soil and groundwater analysis is then performed and the baseline established, or the comparison with prior conditions can be made.

4.4 Environmental Awareness Training

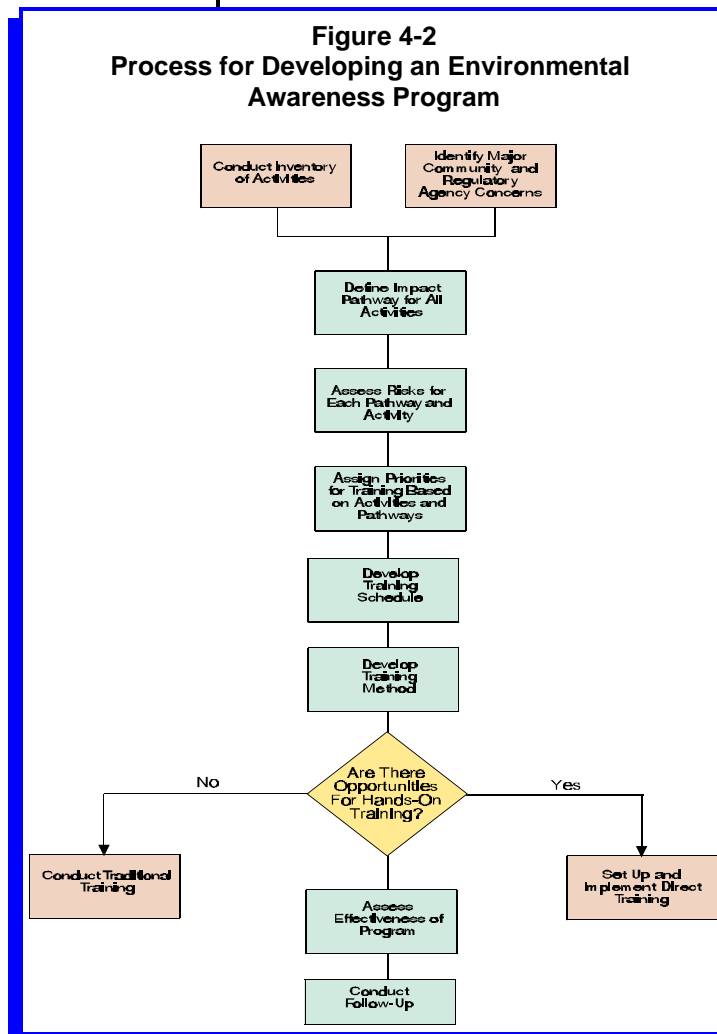
Environmental awareness training of port staff is an important element in environmental risk management. Tenants must be advised on the elements of the program and be encouraged to establish similar training or, as appropriate, participate directly with the port. Training is most applicable if a tenant's activities

have a direct bearing on a port's operating permits, such as stormwater discharge permits. Through effective training programs, both port and tenant staff can understand the environmental management goals and objectives of the port and their respective roles and responsibilities in minimizing the adverse affects of their activities. This kind of training must be differentiated from detailed employee training on environmental compliance issues. Ports should make an informed decision on how far to proceed with providing training for tenants beyond basic environmental awareness training, and should consult with an attorney on this issue. If a port offers its employees environmental training, it could make that opportunity available to its tenants, but the port should not, as a general matter, dictate specific environmental training for its tenants.

4.4.1 Port Training Programs

This section describes a process for developing a training program for ports, considerations for the program, and suggested elements of the program, focusing on the elimination of potential pathways for adverse environmental affects.

The process for developing and implementing a port training program is shown in **Figure 4-2**, and generally includes:



- **Thorough Identification of Activities.** Either through an audit or through day-to-day experiences, all port activities that may affect the environment should be identified.
- **Identify Major Community Concerns.** Through an effective public outreach program, as discussed in Section 5, the port needs to understand which activities cause the greatest concern to the community.
- **Define Potential Environmental Exposure Pathways, Assess Risks, and Assign Priorities.** In this step, the port defines the pathways that present the possibility of adverse environmental affect and assesses the relative risks of each port activity. Based on these risks, and community concerns, the port sets the priorities for the training program.
- **Develop Training Schedule and Method.** In this step, opportunities to conduct non-traditional (hands-on) training should be explored. Also, a training schedule that covers all of the priorities should be developed. The schedule could cover one or more years of training and appropriate intervals for retraining.

- **Conduct Training.** Depending on the method selected, training is conducted either in a classroom or in the field or both.
- **Assess Effectiveness of the Program.** The port should assess the effectiveness of each training program through discussions with the trainees and through follow-up evaluations of port activities. The port should keep accurate records of training including topics covered, dates, locations and attendees.

4.4.2 Development of an Effective Environmental Awareness Training Program

Environmental awareness training should not be considered a one-time effort and there must be commitment to the development of a long-term "program" geared toward meeting the port's environmental goals and objectives. Thus, one of the most important elements of an internal port training program is constant re-evaluation of the effectiveness of the program and re-assignment of training priorities. Through the experiences of ports and other industries, the most effective elements of environmental awareness training programs include:

Training programmes that would be useful to run on a regular basis include:

- Navigation & Environment
- Planning & Research
- Operations & Safety
- Legal Issues
- Finance
- Facilities Engineering
- Administration and Information Technology

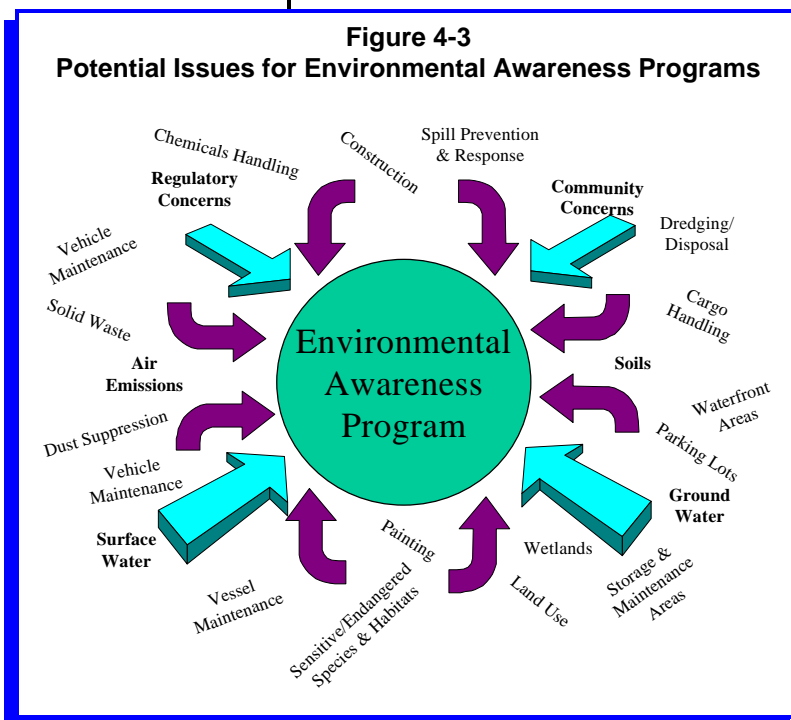
This training may be available through a range of national and regional centres.

- **Conducted Regularly.** Training programs should be conducted routinely to reinforce the port's environmental goals and objectives, and to ensure that environmental management practices are implemented consistently and effectively. It is recommended that some level of environmental awareness training occur at least twice each year. Some form of interim training should be made available for new and/or reassigned employees.
- **Specific to the Port's Operations.** These programs should be geared to the operations conducted at the individual port. Examples of effective EMP implementation, as well as non-compliance issues taken directly from the port, are substantially more effective than examples from other unrelated industries.
- **Geared Toward Easy-to-Use Solutions.** It is essential that the EMPs recommended in the training program be easily incorporated into the day-to-day operations of the port. Most port staff are untrained in environmental management issues, and are focused on moving products either onto or off of facilities. EMPs must be geared to simple modifications of their daily operations to ensure their effective and long-term implementation.
- **Conducted on Single Issues.** While it is often very tempting to conduct day long seminars that cover all the environmental issues, it is often more effective to cover one issue at a time, such as spill prevention or dust suppression.

- **Interactive.** Most training programs are conducted indoors in a classroom setting. However, one of the most effective training approaches is providing hands-on experience in EMP implementation, such as conducting spill response drills.
- **Use Input from Non-Environmental Staff.** Often, the most effective EMPs are developed by operations or maintenance staff. The trainers should encourage trainees to assess their operations and look for cost-effective ways to reduce environmental risks. On an ongoing basis, ports should encourage, possibly through the use of incentives, employees to identify non-compliance issues and/or suggest improvements to existing operations.
- **Short in Duration.** Because conducting training for staff affects a port's ability to conduct its work for a day, training sessions should be brief, and conveniently located to minimize disruption to operations.

4.4.3 Potential Components of an Environmental Awareness Program

Often, the issues that most concern the community surrounding a port are not the same as what the port considers to be most important or highest risk issues facing a port. However, the port should consider these community issues carefully when setting the priorities for its training program. The following section presents ways to reach out to the community to understand its concerns before major problems exist, or before development occurs. **Figure 4-3** presents some potential issues that could be incorporated into a port's training program.



Section 5

Framework for Implementing an Environmental Management Program

This section presents a basic framework for the incorporation of an environmental management program into the structure and day-to-day operations of a port. The framework utilizes an environmental management systems (EMS) approach to determine whether a new or improved program is required and how a port should organize its environmental management activities. An EMS provides an overall management approach for evaluating environmental risks associated with current operations, assessing how to avoid environmental impacts and risks, and developing new processes to improve environmental conditions.

The primary reasons for creating a port-wide environmental management program are to:

- Provide a systematic and consistent approach to environmental improvements including impact reduction and control.
- Reduce operating costs by eliminating, or significantly reducing, remedial actions.
- Enhance public, customer, and supplier/vendor perception of the port through proactive protection of the natural resources and the public.
- Establish and maintain a positive corporate image.
- Promote and enhance port and tenant staff awareness and their shared responsibility to protect the environment.
- Enhance cooperation with regulatory authorities.

While no one environmental management program is suitable for all ports, this section discusses a process for assessing a port's environmental management needs including suggested elements that could be included in an environmental management program, and presents typical environmental management structures currently employed by ports.

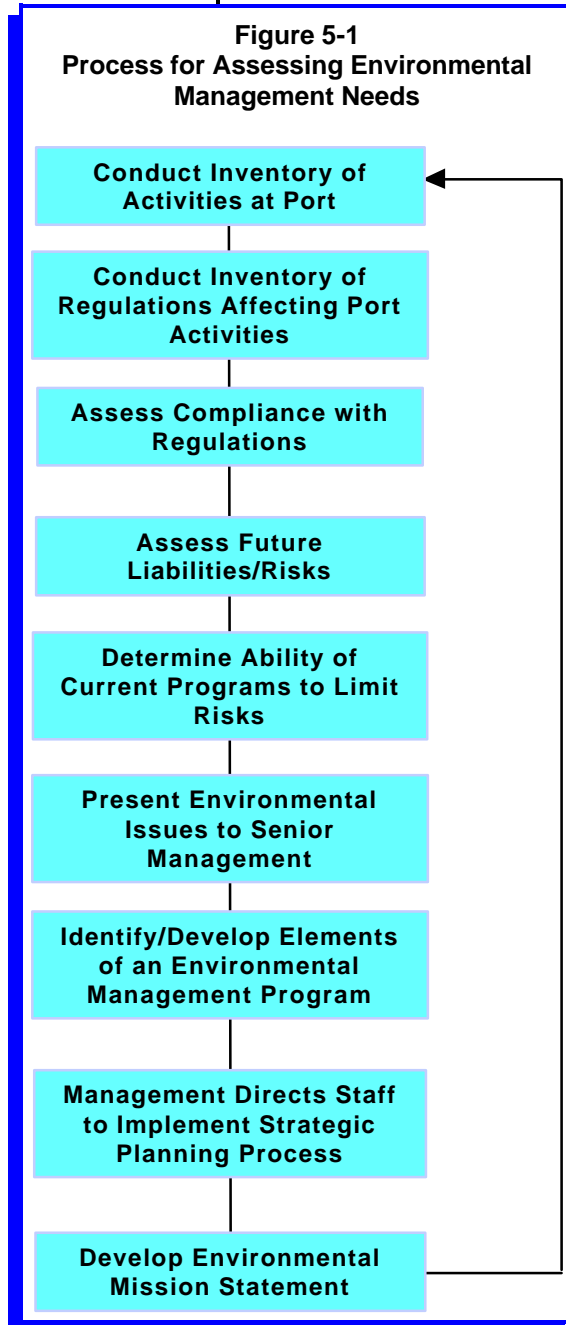
5.1 Assessing a Port's Environmental Management Needs

A concern for many ports is the cost for developing and implementing their environmental management program. This is particularly true for smaller ports that have limited financial resources to effectively monitor and oversee these activities, and minimize impacts. This section provides a process that can be used by any port, regardless of size, to assess their existing environmental conditions and management procedures, leading to improvements in environmental management techniques. The process is flexible, allowing individual ports to develop and implement a strategy based on the resources it has available.

5.1.1 *Evaluation of Environmental Management Needs*

There are a wide variety of strategies that can be employed to improve environmental conditions at a port depending on available funding, local public perception and concerns, regulatory climate, and the degree of risks posed by the port or tenant activities. Because each port's management structure and culture is different, this section describes a basic methodology for assessing environmental conditions and selecting the most effective management approach tailored to their own situation.

Figure 5-1 presents a process for assessing the environmental procedures and conditions at a port using an EMS approach, leading to the development of an effective environmental management program. Each port may find itself at a different level in this chart. However, the chart can be used at any time to reevaluate the port's programs, make midcourse corrections, or institute new processes or procedures. Each step in the process is described below:



- Conduct Inventory of Activities. This step involves developing an inventory of the activities conducted at the port, including both port and tenant operations ranging from bulk storage of materials to storage and handling of small amounts of chemicals. One method to develop the inventory is through either an inventory or environmental compliance audit as discussed in Section 4.
- Conduct Inventory of Regulations Affecting Each Activity. In this step, a summary of applicable environmental regulations, and how they affect each operation, is developed.
- Assess Compliance with Regulations. This step involves a detailed assessment of whether the activities conducted at the port are in compliance with the regulations. This step can be included in an environmental compliance audit, or conducted separately after the activity inventory is conducted.
- Assess Future Impacts/Risks. In this step, the port looks forward, examining the trends in the port industry (e.g., increase in the size of ships or type of cargo) as well as the potential changes to local, state, and federal regulations that may affect port operations.
- Determine Ability of Current Programs to Limit Risks. This step involves evaluating the ability of the current structure to effectively minimize or eliminate environmental impacts. If impacts are being managed effectively, then no further action may be required. However, it may be determined that additional programs or procedures are required.

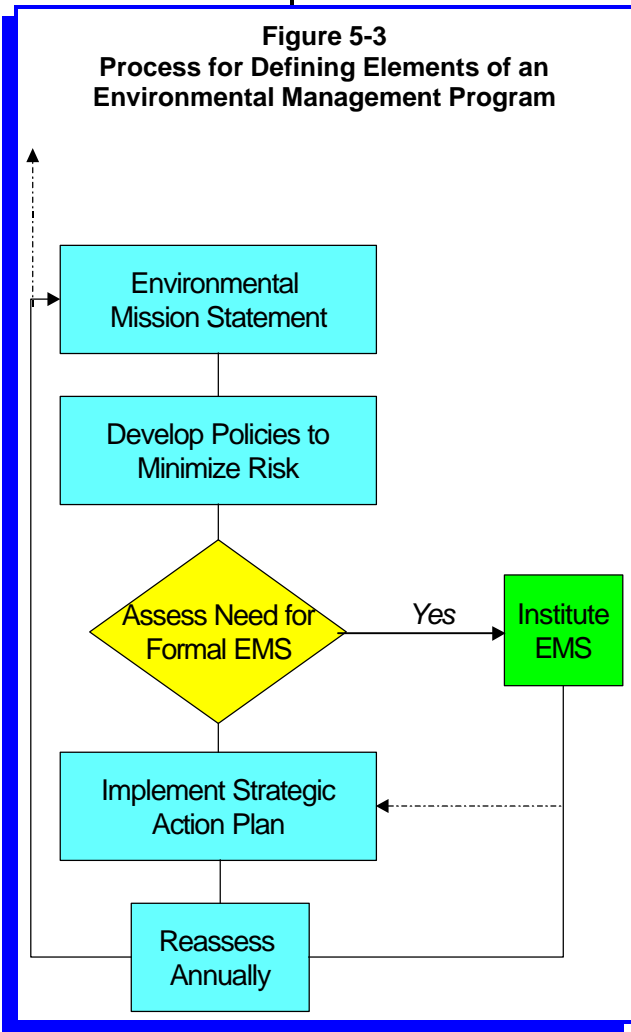
- Present Environmental Issues to Senior Management. This step involves presenting the types of activities, their potential impacts on the environment, potential cost savings associated with proactive management, potential risks, and their regulatory compliance status to the port's senior management.
- Identify/Develop Elements of an Environmental Management Program. In this step, senior management identifies the major elements and the implementation process for a new or revised environmental management program.
- Management Directs Staff to Implement Strategic Planning Process. Once management has determined the need for improvements, they should fully support and direct staff in strategic environmental management planning process. While this step may be conducted separately, it should ultimately be integrated into port's overall strategic planning process.

- Develop Environmental Mission Statement. The most important step in the planning process is to define a port's environmental management mission. A "mission statement" defines the port's purpose and intentions in relation to environmental matters and sets the tone for the port's environmental management program. **Figure ??** at the end of this section, presents selected sections from a variety of port authorities.

Once the environmental mission statement is developed, the port would then begin a process of defining the elements of its environmental management program, again utilizing the EMS approach, as shown in **Figure 5-3**.

These steps include:

- Develop Policies to Minimize Risks. Once the current and potential future impacts have been defined, the port would develop policies intended to guide future actions. Policies can be either general and encompass several issues, or specific to each environmental issue. For example, a general policy may be to develop standard lease language that provides more environmental risk protection.
- Assess Need for Formal EMS. In this step, a port decides if they should institute a formal EMS process. For many ports, simply using an EMS system to evaluate and develop an effective environmental management program will be sufficient based on available resources or activities at the port. However, some larger ports may decide that they need to use, and possibly become certified as in compliance with a specific EMS, such as ISO 14000.



- Develop and Implement a Strategic Action Plan. This step involves developing a series of actions required to implement each individual policy. The actions developed for each policy are then combined into one comprehensive action plan that sets a time line for implementation, presents the cost for implementation, identifies responsible parties, and includes a mechanism for informing management about the progress made in implementing the plan.

On a continuing basis, the improvements made as a result of the action plan should be evaluated. As progress is made in environmental management, reassessment of the port's environmental mission statement, policies and action plan can be conducted using the Plan-Do-Check-Act cycle as described below:

Plan

- what needs to be done
- who needs to do it
- when it needs to be done
- how much to spend on it
- where it will be documented

Check

- progress routinely
- policies and documents against actual operations
- employee reactions
- customer opinions

Do

- develop draft documents
- involve as many staff as possible
- train staff
- communicate activities

Act

- to improve draft documents
- to demonstrate commitment
- to foster change
- to keep moving

5.1.2 Elements of a Strategic Environmental Action Plan

The strategic action plan is the driving force behind the successful implementation of an environmental management program. The plan presents the specific steps that will be taken to implement the program and provides for consistent feedback to port management on the progress made during the implementation process. A plan can take many forms, depending on the type of investment the port is willing to take, the level of acceptable risk, and community/regulatory pressures. A list of recommended topics that could be covered in the plan are presented in **Table 5-1**. (Shown on following page)

5.1.3 Types of Environmental Management Systems

There are a variety of EMS frameworks developed by organizations around the world, as well as a number of which may be integrated into those frameworks:

EMS Frameworks

- Eco-Management and Audit Scheme (EMAS)
- British Standard 7750
- Responsible Care
- International Organization for Standardization (ISO)

Other programs

- Coalition for Environmentally Responsible Economics (CERES)
- The Natural Step (TNS) ¹
- USEPA Project XL
- USEPA Voluntary Pollution Prevention Program

Each of the EMS frameworks are designed to provide guidance in continually improving operations to protect the environment, and are flexible allowing for customized application. Thus, a port could use one of these frameworks to assist in

Table 5-1

Topics for a Strategic Action Plan

- Mission
- Goals & Objectives
- Current Environmental Staff; Roles and Needs
- Priorities for Environmental Management
- Environmental Management Programs
 - Stormwater (e.g., vehicle & equipment washing; illicit connections)
 - Hazardous Materials/Wastes (e.g., chemicals, fluorescent lamp ballasts)
 - Fuel Management
 - Used Oil Management
 - Building Maintenance (e.g., asbestos)
 - Air Emissions
 - Wastewater
 - Spill Prevention & Response
 - Solid Waste Management
 - Construction
- Dredged Material Management Plan
- Community Outreach
- Schedule for Implementation
- Performance Measures
- Follow up

Figure 5-4

ISO Development / Implementation Process



developing or improving its environmental management program, under their individual budget constraints, and within their own time frame. **Figure 5-4** provides the ISO 14001 EMS development / implementation process that could be used as the basis for developing the strategic environmental action plan.

5.1.4 Implementing a Successful Strategic Environmental Management Strategy

There are three factors that can greatly enhance the long-term success of a strategic environmental management program:

¹

TNS is a non-profit environmental education organization that can be found at www.naturalstep.org.

- Senior Management Support for the Program. Senior port management endorsement of and active participation in the development of an environmental management program is essential. Management must also fully support inclusion of environmental management into day-to-day operations of a facility.
 - Implementation of an Open and Inclusive Planning Program. The environmental management strategy planning process must be “inclusive” — every department/division of a port that may be affected by either environmental regulations or the environmental management strategy should be included in the development and policy/decision-making process to ensure long-term support for the program.
 - Commitment of Resources for Long-Term Implementation. It is likely that implementation of an effective environmental management strategy will require dedication of both monetary and personnel resources to maintain permits, report on monitoring, and assist departments in implementing development projects. The port must be committed to providing the necessary resources for long-term investment in environmental impact reduction.
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