Appendix E
Additional Tools

Additional tools provided in this Appendix include:

- List of Requirements for an EMS;
- Sample PowerPoint training presentations:
  - "Environmental Management Systems: Taking Charge of Your Environmental Management Issues" discusses the benefits of EMS; and
  - "Shipbuilding and Ship Repair: Environmental Management Systems Implementation" walks user through the elements of an EMS.

List of **Requirements** for **an EMS**

Who/What	Responsibilities
Top Management	• Define the Environmental Policy • Provide resources essential to the implementation and control of the EMS • Appoint a specific Environmental Management Representative (EMR) • Review the EMS • Address the possible need for changes to policy, objectives, and other elements of the EMS in light of audit results, changing circumstances, and continual improvement
Environmental Policy	• Be appropriate to the nature, scale, and environmental impacts of the facility's activities and services • Include a commitment to continual improvement • Include a commitment to comply with relevant environmental legislation regulations and other requirements to which the facility subscribes • Provide the framework for setting and reviewing environmental objectives and targets • Be documented, implemented, maintained, and communicated to all employees • Be available to the public

Facility	• Establish and maintain procedures to identify environmental aspects • Ensure that aspects related to significant impacts are considered in setting objectives • Keep aspects information up to date • Establish and maintain procedures to identify and have access to legal and other requirements • Establish and maintain documented environmental objectives and targets • Consider legal and other requirements, significant environmental aspects, technological options, financial operations and business requirements, and views of interested parties • Establish and maintain programs for achieving objectives and targets • Identify training needs • Require that all personnel whose work may create a significant impact receive appropriate training • Establish and maintain procedures to make employees at all levels aware of importance of conformance to requirements of the EMS • Establish and maintain procedures to make employees at all levels aware of the significant environmental aspects of their work and benefits of improved personal performance • Establish and maintain procedures to make employees at all levels aware of the potential consequences of departure from specified operating procedures • Establish and maintain procedures for internal communication between various levels of the facility • Establish and maintain procedures for responding to relevant communication from external interested parties • Consider processes for external communication on its significant environmental aspects and record the decision • Establish and maintain information (in paper or electronic form) to describe the core elements of the EMS and provide direction to related documentation • Establish and maintain procedures for controlling all environmental documents • Identify those operations or activities that are associated with the identified significant environmental aspects • Plan activities, including maintenance, to ensure that they are carried out under specific conditions • Establish and maintain documented procedures for significant aspects to cover situations where their absence could lead to deviations from the policy, objectives, and targets

Facility (continued)	• Establish and maintain procedures to identify and respond to accidents and emergencies • Review and revise, where necessary, the emergency preparedness and response procedures (particularly after the occurrence of an accident) • Periodically test the emergency preparedness and response procedure • Establish and maintain documented procedures to monitor and measure, on a regular basis, the key characteristics of operations and activities that have significant environmental impacts • Record information to track performance for defining responsibility and authority for investigating nonconformance, taking action to mitigate impacts caused, and initiating and completing corrective actions • Implement and record changes in the documented procedures resulting from corrective or preventive actions • Establish and maintain procedures for the identification, maintenance, and disposition of environmental records • Establish and maintain programs and procedures for periodic EMS audits
Objectives and Targets	• Be consistent with the Environmental Policy, including the commitment to pollution prevention
Environmental Programs	• Include designation of responsibility for achieving objectives and targets • Include the means and time frame by which objects and targets are to be achieved • Be amended to address new developments or modifications
Environmental Management Representative (EMR)	• Have defined role, responsibility, and authority for ensuring EMS requirements are established • Have defined role, responsibility, and authority for reporting on the performance of the EMS to top management
EMS Coordinator	• Responsible for identifying, assigning, scheduling, providing the necessary support for, and ensuring completion of all tasks relating to the EMS • Works closely with the CFT • Responsible for maintaining the EMS manual, under leadership of the EMR
Personnel Performing Tasks Related to Significant Environmental Impacts	• Be competent on the basis of training education or experience

Documents	• Be easily located • Be periodically reviewed, revised as necessary, and approved for adequacy by authorized persons • Be current and available at all locations where operations are performed • Be legible • Be dated (with dates of revision) • Be maintained in an orderly manner • Be retained for a specific period
Obsolete Documents	• Be promptly removed from all points of issue or otherwise assured against unintended use • Retained for legal or knowledge preservation purposes
Procedures Related to Significant Environmental Aspects	• Define normal operating criteria • Be communicated to suppliers and contractors
Monitoring Equipment	• Be calibrated, maintained, and retain records of this process
Corrective or Preventive Actions	• Be appropriate to the magnitude of problems and commensurate with the environmental impact encountered
Environmental Records	• Be legible, identifiable, and traceable to the activity, product, or service involved • Be stored and maintained in a way that they are readily retrievable and protected from damage, deterioration, or loss • Contain specific recorded retention times • Be maintained as appropriate to the system and the facility to demonstrate conformance to the requirements of the EMS
EMS Audits	• Be carried out to determine if the EMS conforms to planned arrangements and has been properly implemented and maintained • Provide information to top management • Be prioritized based on environmental importance and the result of previous audits

Environmental Management Systems: Taking Charge of Your Environmental Management Issues

Environmental Management Systems: Taking Charge of Your Environmental Management Issues

{Facility Name}

5/20/03 1

The Challenge

The Shipbuilding and Ship Repair Industry faces a wide range of pressures

- Increasing costs
- Growing community concerns
- Changing employee expectations
- Increasing customer demands & requirements
- Greater competition (global and domestic)

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The Challenge

Many managers are in constant fire-fighting mode in dealing with environmental affairs

- Without a clear direction, environmental issues drop to the bottom of the list until they are urgent
- Urgency, limited staff time, and lack of expertise often limit options and the effectiveness of environmental actions
- Root causes are often not addressed, so reactive mode of crisis/response continues

3

EMS: Take Charge of Your Environmental Efforts

An environmental management system (EMS) can help a company

- Take control through understanding root causes & having time to develop effective solutions that address underlying conditions
- Shift from a reactive to proactive approach to addressing environmental efforts
- Integrate environmental efforts with business priorities and concerns

4

An EMS Builds on What you Already Do

- You don't have to reinvent the wheel
- Existing environmental efforts can be leveraged to provide more efficiency & value
- EMS can be integrated with Quality management systems such as ISO 9000
- You will examine what you have now, identify where you want to go, and address any gaps

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EMS Uses a Plan-Do-Check-Act Approach

- Based on quality management principles that have shown their value in all types & sizes of businesses worldwide
- Recognizes that perfection is the goal, but is never fully attained
- EMS is dynamic, allowing you to continue to adapt as future conditions change
- Focuses on continual improvement

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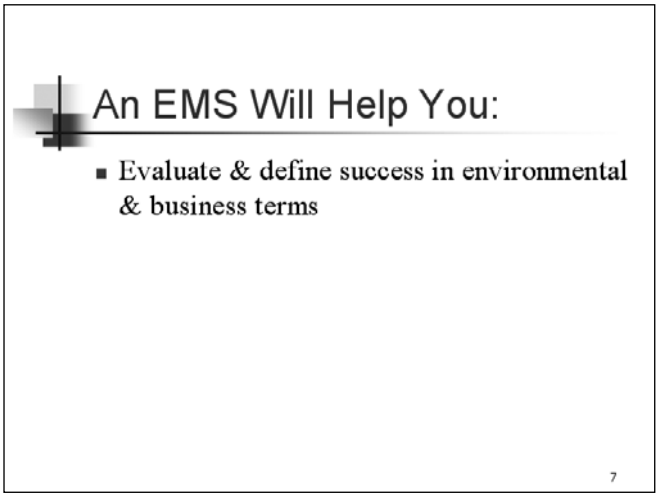
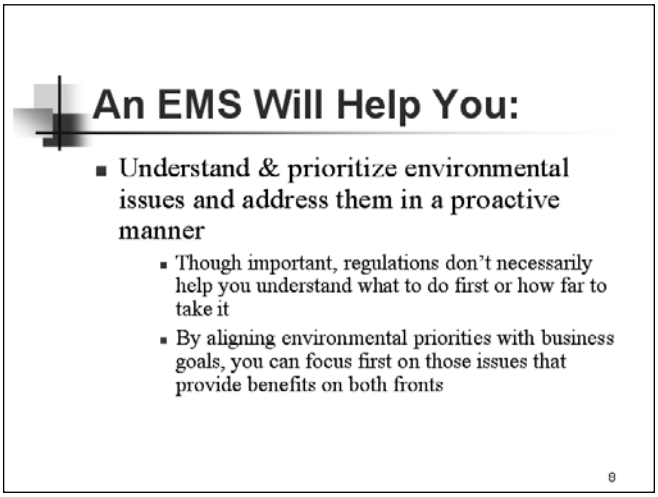
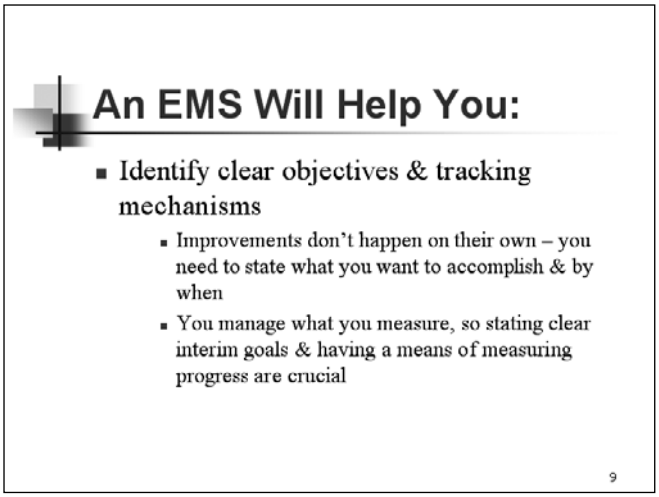
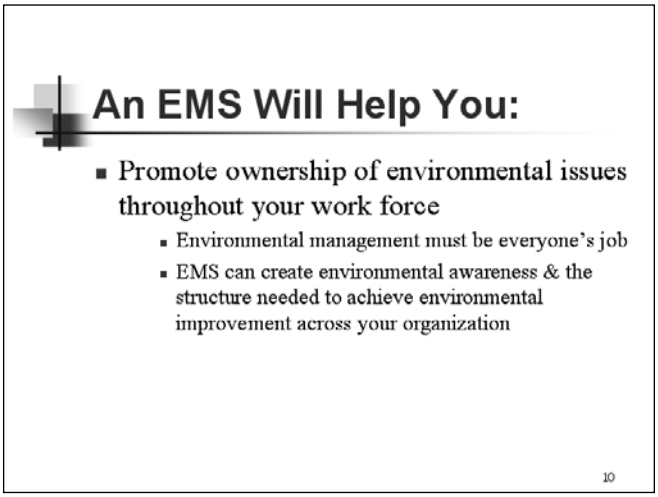
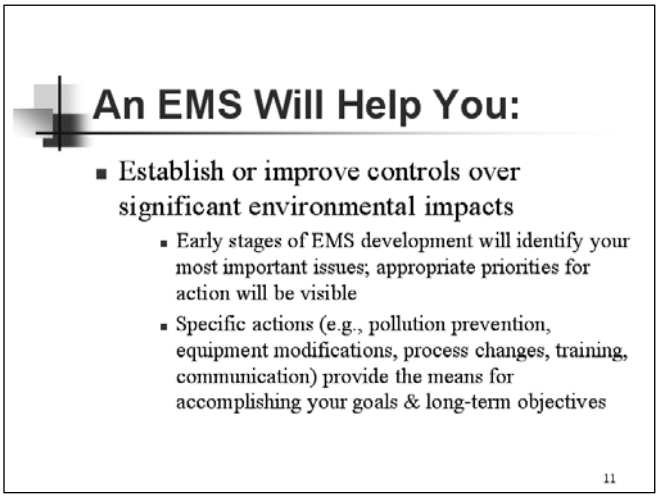
Environmental Management Systems: Taking Charge of Your Environmental Management Issues (continued)

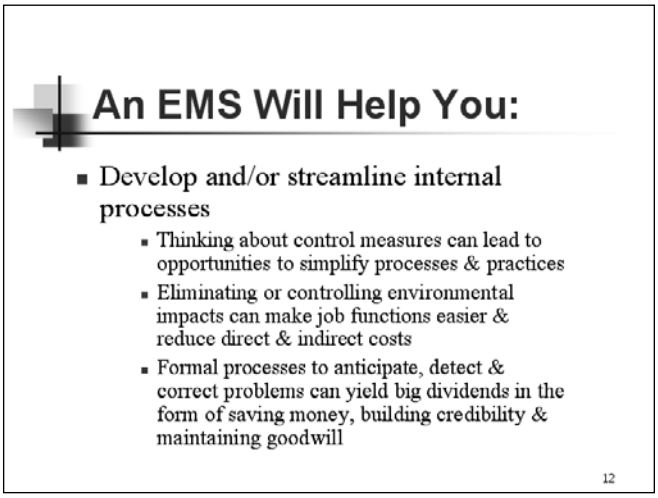












Environmental Management Systems:
Taking Charge of Your Environmental Management Issues (continued)

An EMS Will Help you:

- Report your progress to your management, regulators, customers & the community
  - EMS provides the structure to measure progress against goals
  - Reporting progress to stakeholders builds trust & credibility

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What it Takes

- Sustained effort
- Top management dedication to excellence & leadership
- Resources – your own people & some limited outside help

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But, a Properly Implemented EMS…

Should Pay for Itself Many Times Over

- The process yields new opportunities for savings
- Operating costs savings are permanent
- Many companies have surprised themselves
  - Better than expected environmental & financial performance
  - Burden of formalizing approaches & developing all the connections not as great as people fear

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Benefits of an EMS

An EMS will help {Facility Name} achieve:

- More control over a rapidly evolving, increasingly important business factor – The Environment
- Better planning & therefore, fewer surprises
- Improved efficiency & lower costs
- Enhanced employee morale & retention
- Better relations with regulators & the community
- Potential regulatory relief
- Stronger customer relationships & competitive position

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The Bottom Line

Companies don't do EMS because it's a nice idea – they do it because it helps them achieve better business results

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Why Pursue EMS Now?

EPA's Sustainable Industries Program is providing assistance to shipbuilding and ship repair facilities – including:

- Developing an EMS template for this industry
- Working with volunteer ship building and repair facilities to do a pilot EMS implementation project

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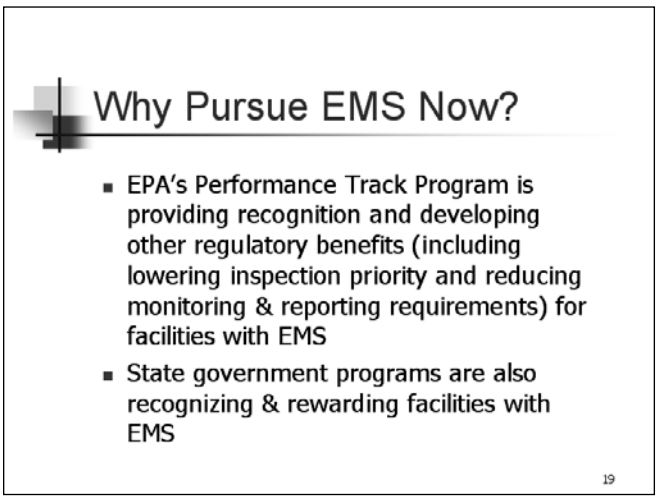
Environmental Management Systems: Taking Charge of Your Environmental Management Issues (continued)



Shipbuilding and **Ship Repair:** Environmental **Management Systems Implementation**

SHIPBUILDING AND SHIP REPAIR

Environmental Management Systems Implementation

Module 1

Laying the Groundwork

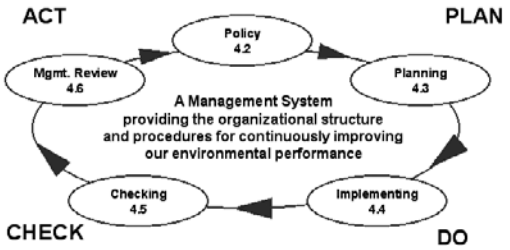
What an EMS is:

- A management system standard
- A management system that commits to compliance with environmental regulations
- A road map by which a company can meet its environmental goals
- A system built on previously existing programs and procedures
- A continuous improvement process
- An accountability process ("Say what you do, do what you say, prove it")
- An awareness program for the employees and the community
- A human-based system

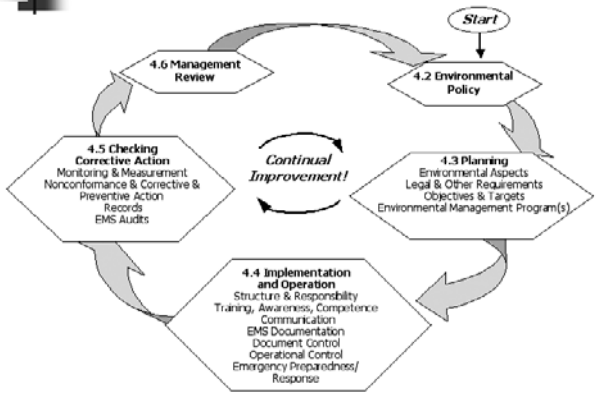
What an EMS is not:

- Legal requirement
- Necessarily oriented toward Occupational Safety and Health
- A performance standard
- An attempt to immediately address every potential environmental impact
- A static system
- Something a consultant can do for you

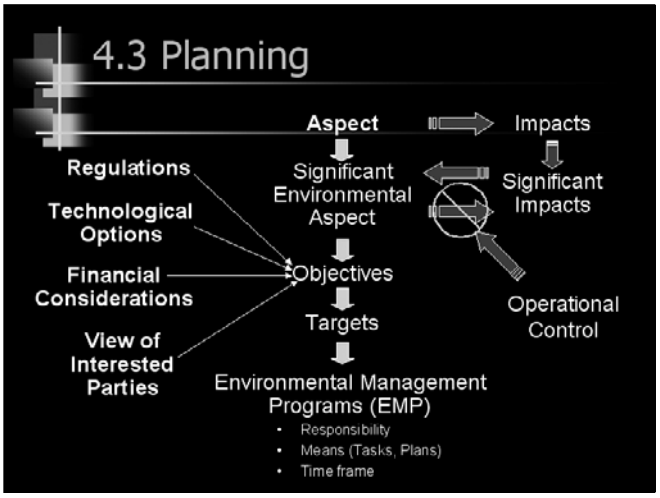
The ISO 14001 EMS Model

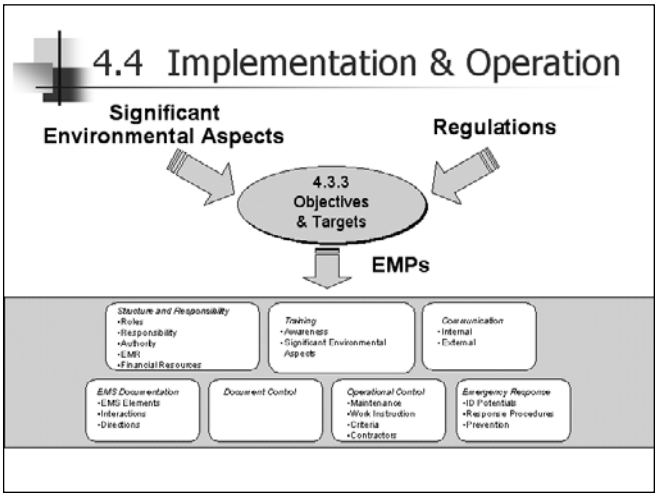


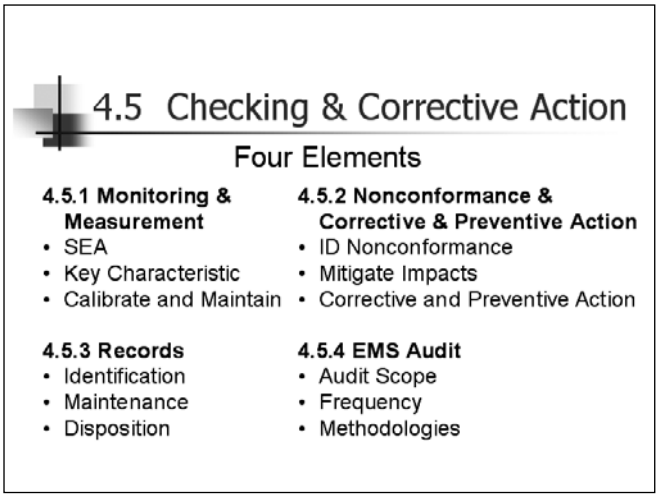
Elements of an EMS

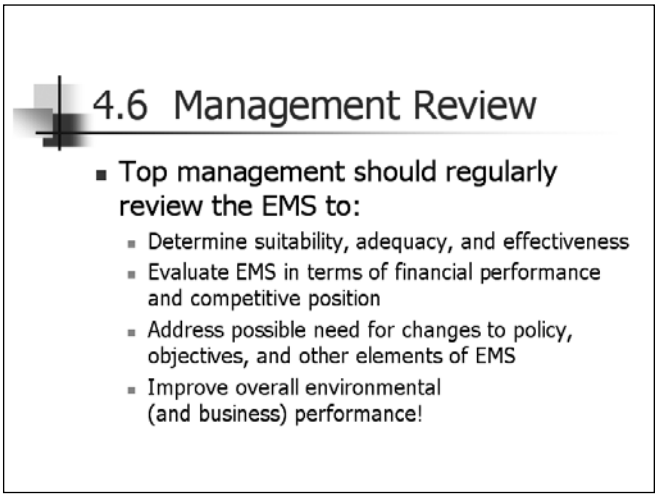


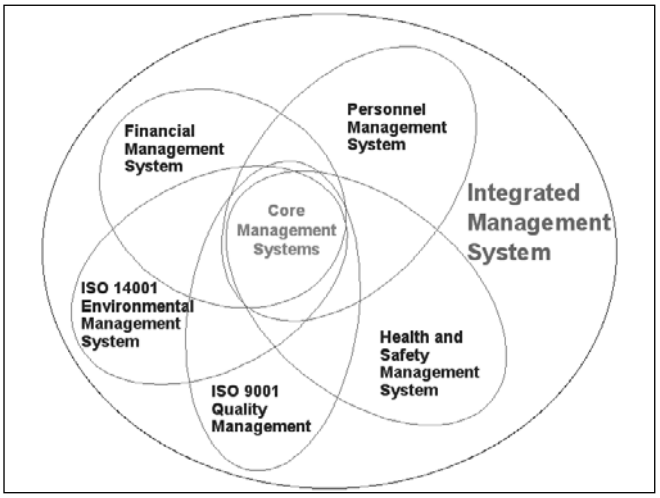
Shipbuilding and Ship Repair: Environmental Management Systems Implementation (continued)

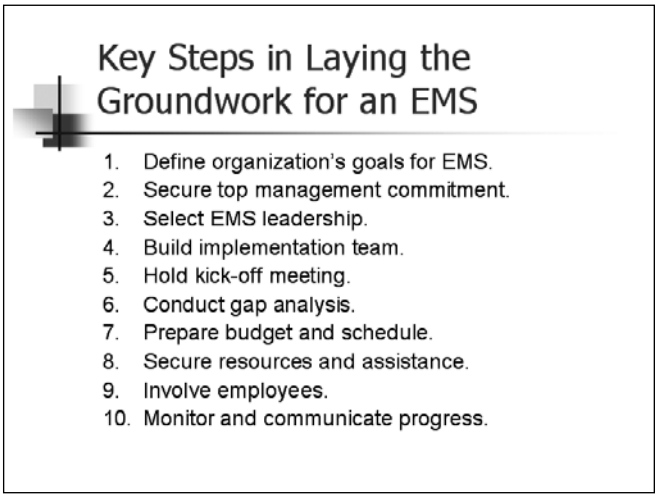












Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

Defining an Appropriate Scope

Consider for example:

- Boundaries of permits or approvals
- Extent of authority to which environmental policy applies
- Extent of authority to allocate resources

Gap Analysis

- It is a set of questions or prompts that represent the requirements of an effective EMS
- It should identify existing system components that should be further integrated
- It should identify specific needs and areas for improvement

Gap Analysis

Facility Name: Date: Assessor(s):

EMS Requirement	Yes	No	NA	Findings/Remarks	Closed
Module 2: Structure & Responsibility					
Facility has defined the roles, responsibilities, and authorities to facilitate an effective EMS.					
Facility management has appointed an EMR with defined roles and responsibilities to implement the EMS.					
Facility EMR reports on the performance of the EMS to top management for review and continuous improvement.					
Module 3: Environmental Policy					
Top management has defined the facility's environmental policy.					
Policy is specific to facility and is appropriate to the nature, scale and environmental impacts of its activities, products or services.					
Policy includes a commitment to continuous improvement in environmental performance and the prevention of pollution.					
Policy includes a commitment to sharing information on EMS performance with the community.					

Notes:
NA Not applicable
Closed Indicates completion
EMS Environmental Management System
EMR Environmental Management Representative
CFT Cross functional team
SEA Significant environmental aspect
EP&R Emergency Preparedness and Response
CAPAN Corrective and Preventive Action Notice

Worksheet for Persons Responsible for EMS Implementation

Roles	Individual(s) Responsible	% of Time Designated	Budget
EMR with responsibility for implementing the EMS (in small businesses, this could be the owner).			
EMS Coordinator			
EMS Team Participants (CFT)			
Conduct gap analysis.			
Identify and determine significance of environmental aspects.			
Identify and determine applicability of legal and other requirements			
Address competency-based training.			
Address operational controls.			
Implement emergency preparedness and response.			
Monitoring and measurement of "key characteristics" of operations and activities that can have significant environmental impacts (i.e., the "significant environmental aspects").			
Periodically evaluate environmental compliance.			
Handle and investigate non-conformance with the EMS.			
Address records management.			
Implement internal EMS audits.			
Contact Person:		Date Completed:	

Areas Where Level of Effort Could Be Significant

- Aspect gathering and significance determination
- Developing procedures and work instructions
- Awareness training—each employee

How Birds See the World

Far Side, Gary Larson

EMS

Looking at everyday things from a different perspective

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

Module 2

Structure and Responsibility

Your EMS Checklist for Structure and Responsibility

- Designated an EMR and have letter of appointment signed by top management
- Designated an EMS Coordinator (if separate from EMR as recommended)

Your EMS Checklist for Structure and Responsibility

Selected CFT members who represent their departments, comprise broad expertise, and assists in:

- Identifying aspects and determining significance
- Setting objectives and targets
- Implementing environmental management programs
- Reviewing and tracking EMS internal audits results
- Cascading EMS information throughout the organization

Your EMS Checklist for Structure and Responsibility

Begun to address other important roles:

- Internal Audit Team
- Department Managers
- Area Supervisors
- Document and Record Administrator
- Quality Management System Coordinator

Your EMS Checklist for Structure and Responsibility

Making plans to:

- Include EMS responsibilities on everyone's job description
- Make meeting EMS objectives and targets a factor in performance evaluations
- Reward individuals who help the company meet EMS objectives

Your EMS Checklist for Structure and Responsibility

Making plans to:

- Structure accounting and financial functions to track true total cost of environmental issues
- Relate true cost of waste and non-compliance back to production units and make supervisors accountable

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

Your EMS Checklist for Structure and Responsibility

- Organizational chart that represents structure as it applies to the scope of the EMS
- Written descriptions of EMS responsibilities that correspond to the roles in org. chart
- Top management meeting minutes demonstrating concurrence with EMS objectives and targets

Module 4

Legal and Other Requirements

Your EMS Checklist for LOR

- Do you have a procedure to identify and provide access to LOR?
- Do you maintain access to all LOR?
- Have you documented your LOR (for use and for audits)?

Your EMS Checklist for LOR

Don't forget Other Requirements that could include:

- Corporate policies
- EPA Performance Track commitments
- Industry codes of practice
- Other voluntary commitments (CERES, etc.)

Example 4 -2: Shipbuilding and Ship Repair Industry Operations: List of Applicable Legal and Other Requirements

Identification			Production Process						Facility Support			

Module 5

Environmental Aspects

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

Identifying Aspects and Determining Significance

Provide a comprehensive basis and linkage to:

- Objectives and targets
- Operational controls and EMPs
- Monitoring and measurement requirements
- Training needs

Aspect Identification: Subdividing the Facility

- Appropriate balance between information glut and information gaps
- Appropriate for fostering ownership and local control

Aspect Identification: Who Should Do It?

Consider using small teams that include:

- Environmental staff (provide expertise and consistent approach)
- Department/area representatives (provide knowledge of the process and serve as information conduit)

Aspect Identification: What To Do?

- Inspect Each Process/Activity
- Create Process Flow Diagrams That Consider All Inputs
  - Energy Use
  - Water Use
  - Supplies/Disposables
  - Chemicals

Aspect Identification: What To Do? (Cont)

Create Process Flow Diagrams That Consider All Outputs

- Air Emissions
- Noise/Odor/Radiation
- Wastes
- Water Discharge
- Storm Water Discharge
- Spillage and Other

Aspect Identification: What To Do? (Cont)

Create Process Flow Diagrams That Consider All Situations

- Normal Operation
- Start Up
- Shut Down
- Emergency Situations
- Decommissioning
- Estimate Quantities (with available information)

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

Aspect Identification Form

Person Completing Form: | Area/Process: | Date:

ASPECT IDENTIFICATION			SIGNIFICANCE DETERMINATION						OBJECTIVES & TARGETS*	
Category/Aspect	Inputs, Processes, Outputs, Products	Quantity or Volume	Legal Requirements and Voluntary Commitments, Company Policy	Community Concern	Pollution Prevention Potential	Potential Impact to the Environment	S/N	Rationale for Significance (S) or Non-significance (N)	Objective & Type [illegible]	Target
Energy Usage:										
Water Usage:										
Supplies/Disposables:										
Chemicals:										
Air Emissions:										
Noise/Odor/Radiation:										
Wastes:										
Water Discharges:										
Stormwater Discharges:										
Spillage and Other:										

Determining Significance

One Option:

- Legal Requirements/Voluntary Commitments/Company Policy
- Community Concerns
- Pollution Prevention Potential
- Potential Impact to the Environment (see also App. E)
  - Toxicity (characterization of materials and wastes)
  - Amounts (volume/mass of emissions, waste, or releases)
  - Amounts (consumption of renewable/non-renewable resources)
  - Frequency of episodes
  - Severity of actual or potential impacts

Determining Significance (Cont'd.)

Second Option:

- Legal and Other Requirements
- Company Policy
- Environmental Significance
  - Scale
  - Severity
  - Probability
  - Duration
- Business Significance
  - Effect on public image
  - Outcome of change on process
  - Concerns of interested parties
  - Cost of changing impact

Significance Determination for Aspects Based on Environmental and Business Considerations

Person Completing Form: | Area/Process: | Date:

Aspects Not Meeting Regulatory or Company Policy Criteria	Potential Impacts	Level of Control	Environmental Significance (Scale of 1-5 per Definitions)					Business Significance (Scale of 1-5 per Definitions)					
		High, Medium or Low	Scale	Severity	Probability	Duration	Average Score	Difficulty Changing Impact	Effect on Public Image	Outcome of Change on Process	Concerns of Interested Parties	Costs of Changing Impact	Average Score
Supplies:													
Chemicals:													
Energy Use:													
Water Use:													
Air Emissions:													
Noise/Odor/Radiation:													
Water Discharges:													
Solid Wastes:													
Storm Water Discharges:													
Spills:													
Other inputs and outputs:													

Definitions To Be Used In Rating Environmental And Business Considerations

	PARAMETER	RATING CATEGORIES				
		1	2	3	4	5
ENVIRONMENTAL CONSIDERATIONS	SCALE	insignificant volume/quantity	low volume/quantity	medium volume/quantity but sporadic	medium volume/quantity but ongoing	high volume/quantity
	SEVERITY	no/small impact	moderate impact but localized & readily containable	moderate impact over multiple locations	significant impact and/or regional	extreme impact and/or potential for global impact
	PROBABILITY	very unlikely under any operating condition	occurs during abnormal/emergency conditions/ probability anticipated & managed	occurs during multi-medium new projects or routine maintenance activities	occurs during major new projects or major maintenance activities	occurring during normal operating conditions & artifact of operations
	DURATION	quite transient extremely short-term duration within one day	less than one month	one-six months	less than one year	long-term duration greater than one year or continuous
BUSINESS CONSIDERATIONS	DIFFICULTY OF CHANGING IMPACT	easy to accomplish	minor level of effort required	moderate effort required	major effort required	impact cannot be changed only managed
	EFFECT ON PUBLIC IMAGE/ PERCEPTION	no effect	minor/local scrutiny	moderate public scrutiny manageable	intense local or regional scrutiny requiring more effort	extreme scrutiny, major company profile impact
	OUTCOME OF CHANGE ON ACT/PROD/SVCS*	no effect	minimal effect	medium effect	large effect	extremely large effect
	CONCERNS OF INTERESTED PARTIES*	no concerns	minor interest at local level, limited number of parties	moderate interest/manageable at local/prov. level, lots # parties	major interest at federal level, more widespread, > # parties	international/major impact, e.g., financial/legal/image
	COST OF CHANGING IMPACT	extreme, greater than >$1m	major process change, >$500k, but <$1m	moderate process changes, <$500k	minor process change, <$25,000	procedural, < less than $1000

LEGEND

*Interested parties could include:

• Employees	• Local Agencies
• Community	• Shareholders
• Federal Agencies	• Special Interest Groups
• State Agencies	

ACT/PROD/SVCS: Activities / Products / Services

Your EMS Checklist for Environmental Aspects

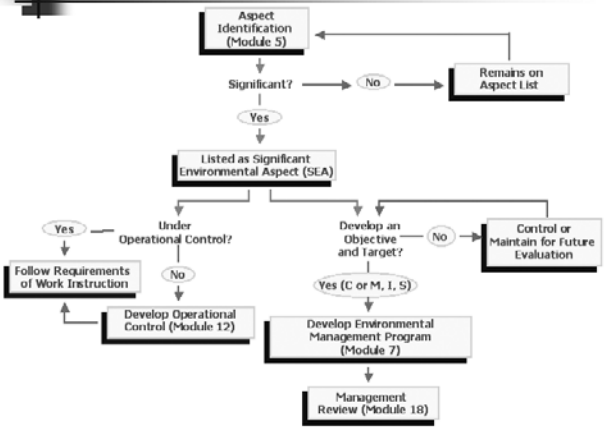
- Procedure for Identification of Environmental Aspects and Determination of Significant Aspects (incl. frequency of review)
- Documented Aspects Lists
- Documented Rationale for Significance Determination

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

Module 6

Objectives and Targets

Process to Evaluate and Address SEAs



Definitions (per ISO 14001)

Environmental Objective

Overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve and which is quantified where practicable.

Environmental Target

Detailed performance requirement, quantified where practicable, applicable to the organization or parts thereof that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.

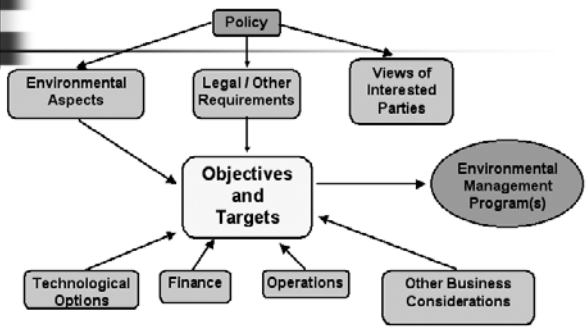
Objectives Can Focus on

- Performance, based on achieving:
  - Direct reduction or elimination of impact to environment
  - A number, percentage, quantity
- System, based on achieving:
  - Improvement to the system
  - Indirect reduction or elimination of impact to environment

Three Types of Objectives

- Control or Maintain
  - Compliance with rules and regulations
  - Keep spray painting equipment operating in accordance with good operating practice
- Improve
  - Reduce energy use
  - Increase paper recycling
- Study or Investigate
  - Investigate alternate chemicals for cleaning

Considerations



Shipbuilding and Ship Repair: Environmental Management Systems Implementation (continued)

Environmental Target

- Performance requirement
- Quantifies the objective
- Sets the time scale
- Must be met in order to achieve the objective

Sample Objectives and Targets

Objective:	Reduce use of hazardous chemicals
Target:	1. Reduce use of high-VOC paints by 25% by 01/04 2. Increase use of water soluble cutting fluids by 15% by 01/04
Objective:	Reduce energy use
Target:	1. Reduce electricity use by 10% by 01/04 2. Reduce nat. gas use by 15% by 01/04
Objective:	Reduce water use
Target:	Reduce water use by 10% by 01/02

Example 6 -1: Objectives and Targets Organized by Category

Objectives	Targets
Supplies	
Increase use of non hazardous chemicals by suppliers	• Increase use of suppliers that provide alternative chemicals by 15% by January 2002
Reduce amount of supplies used	• Implement recycling of supplies (abrasive media, oil, plastic, laser cartridges, metal, paint booth water) respectively by January 2004 • Implement reuse program for wooden pallets by January 2004
Chemicals	
Reduce usage of hazardous chemicals	• Reduce use of high-VOC paints by 25% by January 2004 • Increase use of water-soluble cutting fluids by 15% by January 2004
Energy Use	
Reduce energy usage	• Reduce electricity use by 10% by January 2004 • Reduce natural gas use by 15% by January 2004
Water Use	
Reduce water use	• Reduce water use by 10% by January 2002
Air Emissions	
Reduce air emissions	• Reduce boiler emissions by 10% by January 2004 • Improve material handling practices (for example, use of paint warming cabinets) by January 2004 • Improve paint usage tracking system by January 2004 • Reduce paint overspray by 25% by January 2004 by training personnel on correct spray painting techniques and developing maintenance program for spray painting equipment to allow maximum transfer efficiency (to be supported by paint vendor).

Example 6 -1 (Cont'd.): Objectives and Targets Organized by Category

Objectives	Targets
Water Discharges	
Reduce VOCs in wastewater discharges	• Increase use of aqueous cleaners by 20% by January 2004
Improve habitat and water quality of estuary	• Restore fish stocks and habitat by January 2004
Solid/Liquid Wastes	
Reduce paint waste	• Reduce paint waste by 25% by paint mixing at point of use by January 2004
Reduce hazardous waste	• To be achieved by target above and reduction of hazardous chemicals use
Stormwater Discharges	
Reduce metal concentration in storm water discharge	• Improve stormwater collection and filtration system by January 2004 • Investigate effectiveness of additional best management practices (BMPs) by January 2003
Spills	
Reduce occurrence of spills	• Reduce spill occurrence by 10% by January 2004 by training the following personnel: (1) all plant personnel will receive awareness training during 2002, (2) all raw material handling personnel will receive spill prevention training during 2003, and (3) all production personnel will receive spill control training to reduce spills that exit the plant during 2003. Also, CFT will develop a team to conduct a root-cause analysis of spills during 2002 that will be incorporated into the training program.

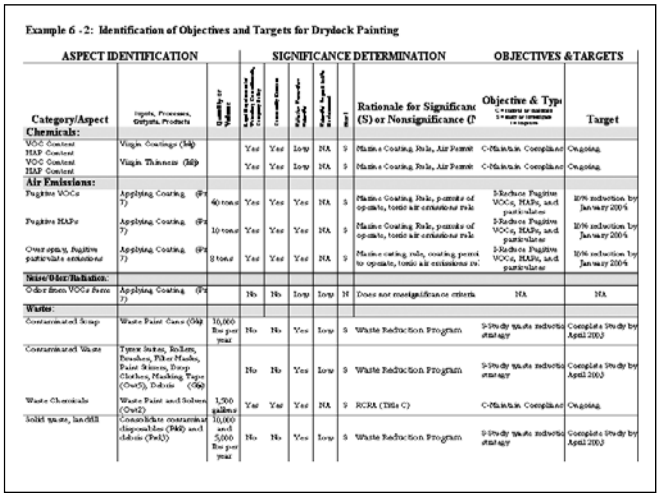
Responsibility

- The Cross Functional Team (CFT)
  - Develops documented objectives for management consideration and approval
  - Includes resource needs
- Top Management (ex., facility manager)
  - Authorizes objectives (and targets)
  - Provides adequate resources
  - Monitors progress
  - Uses normal business planning process to set and track environmental objectives and targets

Sample O&T Procedure

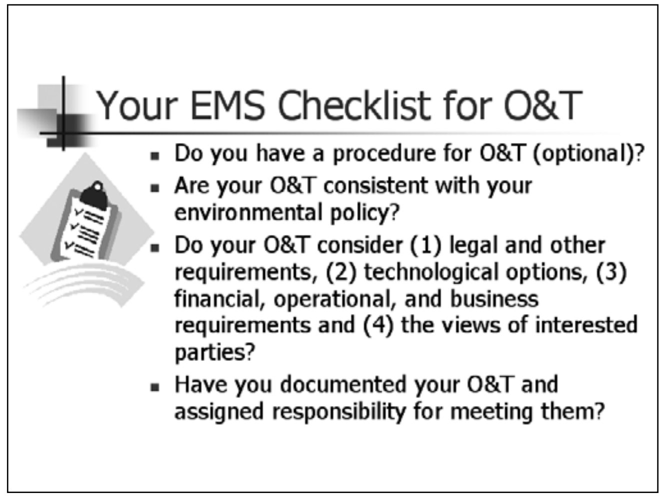
- Tool 6-2 (with Form 5-2, Ex 6-1, Tool 7-2)
- CFT assigns objectives
- Objectives as
  - C = Control or Maintain
  - I = Improve
  - S = Study or Investigate
- Management approves, EMR assigns
- Targets provide detailed performance requirements (Form 5-2)
- Can roll up facility-wide O&T (Ex 6-1)
- Suggested review at least annually

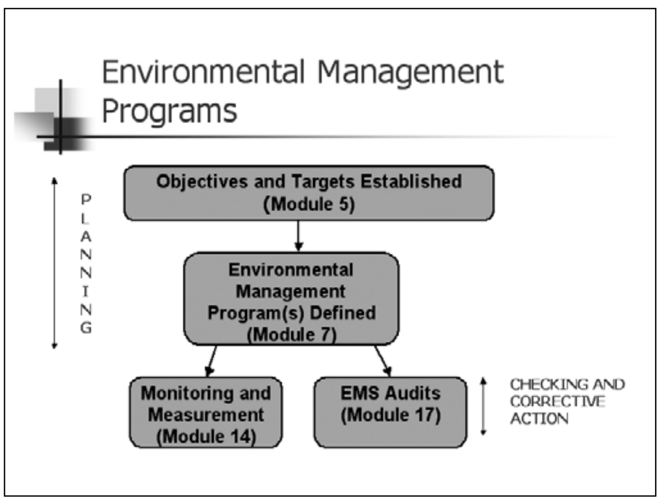
Shipbuilding and Ship Repair: Environmental Management Systems Implementation (continued)

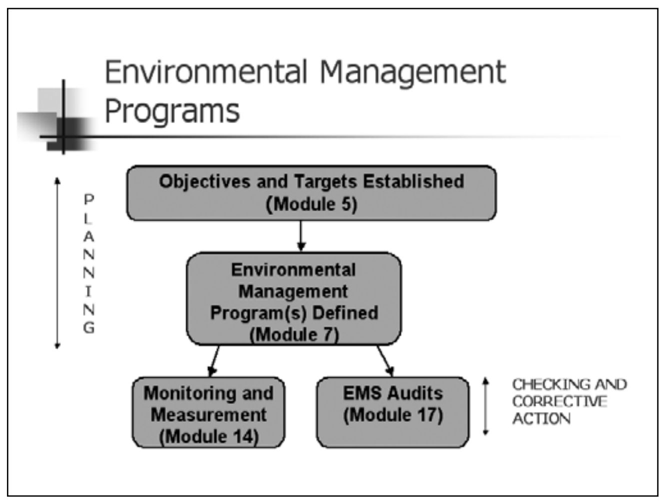


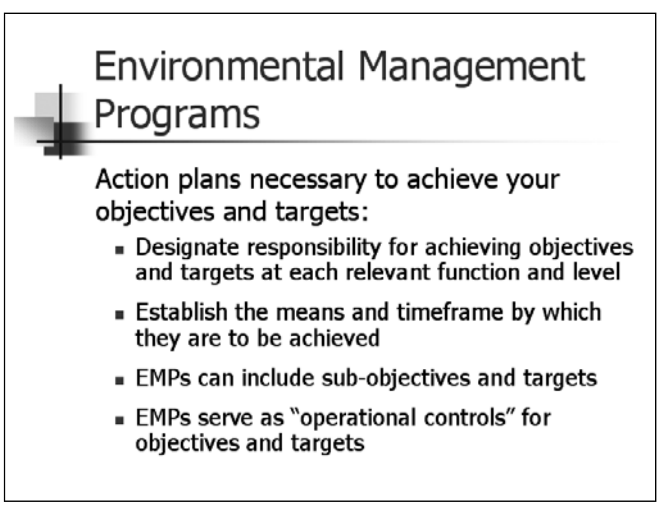
Example 6 - 2: Identification of Objectives and Targets for Drydock Painting

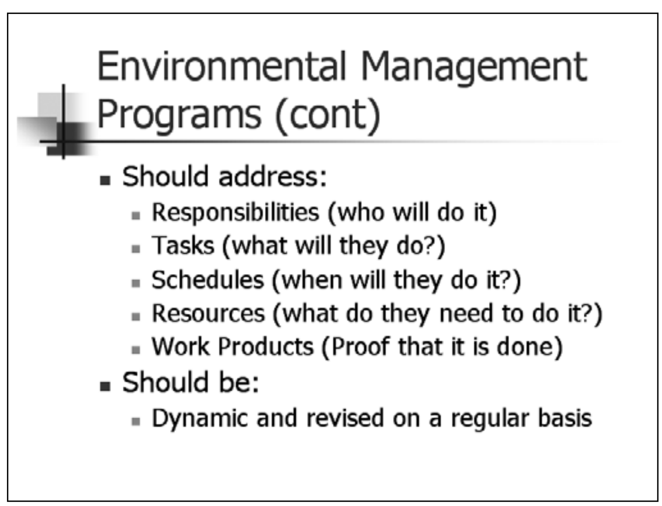
ASPECT IDENTIFICATION			SIGNIFICANCE DETERMINATION						OBJECTIVES & TARGETS	
Category/Aspect	Inputs, Processes, Outputs, Products	Quantity or Volume	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Rationale for Significance (S) or Nonsignificance (N	Objective & Type	Target
Chemicals:										
VOC Content HAP Content	Virgin Coatings (In1)		Yes	Yes	Low	NA	S	Marine Coating Rule, Air Permit	C-Maintain Compliance	Ongoing
VOC Content HAP Content	Virgin Thinners (In2)		Yes	Yes	Low	NA	S	Marine Coating Rule, Air Permit	C-Maintain Compliance	Ongoing
Air Emissions:										
Fugitive VOCs	Applying Coating (Pr 7)	40 tons	Yes	Yes	Yes	NA	S	Marine Coating Rule, permits of operate, toxic air emissions rule	I-Reduce Fugitive VOCs, HAPs, and particulates	10% reduction by January 2004
Fugitive HAPs	Applying Coating (Pr 7)	10 tons	Yes	Yes	Yes	NA	S	Marine Coating Rule, permits of operate, toxic air emissions rule	I-Reduce Fugitive VOCs, HAPs, and particulates	10% reduction by January 2004
Over spray, fugitive particulate emissions	Applying Coating (Pr 7)	8 tons	Yes	Yes	Yes	NA	S	Marine coating rule, coating permit to operate, toxic air emissions rule	I-Reduce Fugitive VOCs, HAPs, and particulates	10% reduction by January 2004
Noise/Odor/Radiation:										
Odor from VOCs fume	Applying Coating (Pr 7)		No	No	Low	Low	N	Does not meet significance criteria	NA	NA
Wastes:										
Contaminated Scrap	Waste Paint Cans (Out)	10,000 lbs per year	No	No	Yes	Low	S	Waste Reduction Program	S-Study waste reduction strategy	Complete Study by April 2003
Contaminated Waste	Tyvex Suites, Rollers, Brushes, Filter Masks, Paint Stirrers, Drop Clothes, Masking Tape (Out5), Debris (Out)		No	No	Yes	Low	S	Waste Reduction Program	S-Study waste reduction strategy	Complete Study by April 2003
Waste Chemicals	Waste Paint and Solvent (Out2)	1,500 gallons	Yes	Yes	Yes	NA	S	RCRA (Title C)	C-Maintain Compliance	Ongoing
Solid waste, landfill	Consolidate contaminated disposables (Pr8) and debris (Pr13)	10,000 and 5,000 lbs per year	No	No	Yes	Low	S	Waste Reduction Program	S-Study waste reduction strategy	Complete Study by April 2003


Your EMS Checklist for O&T
Do you have a procedure for O&T (optional)?
Are your O&T consistent with your environmental policy?
Do your O&T consider (1) legal and other requirements, (2) technological options, (3) financial, operational, and business requirements and (4) the views of interested parties?
Have you documented your O&T and assigned responsibility for meeting them?






Environmental Management Programs
Action plans necessary to achieve your objectives and targets:
Designate responsibility for achieving objectives and targets at each relevant function and level
Establish the means and timeframe by which they are to be achieved
EMPs can include sub-objectives and targets
EMPs serve as "operational controls" for objectives and targets


Environmental Management Programs (cont)
Should address:
Responsibilities (who will do it)
Tasks (what will they do?)
Schedules (when will they do it?)
Resources (what do they need to do it?)
Work Products (Proof that it is done)
Should be:
Dynamic and revised on a regular basis

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

Environmental Management Programs (cont)

Suggestion for EMPs:

- For every objective of the improvement and investigate type, have a corresponding EMP
- Keep the EMPs simple and up-to-date

EMP Tools in Guide

- Form 7-1: Sample Form for EMPs (and examples 7-1 and 7-2)
- Tool 7-2: Sample Procedure for Review for New Purchases, Processes and Products
- Form 7-2: Sample form to Use with Tool 7-2

Example 7 -1: EMP for Reduction of Fugitive VOC, HAP, and Particulate Emissions

Area/Department(s): Construction and Repair (see Example 5-1) - Painting
Process: Drydock Painting.
Significant Environmental Aspect: Fugitive VOCs, HAPs, and particulates
Legal & Regulatory Requirement: Marine Coating Rule, permits to operate, toxic air emissions rule

Objective: Reduce Fugitive VOC, HAP, and particulate emissions
Target: 10% Reduction by January 2004 (relative to year 2000 baseline)

Category: [X] Control/Maintain [X] Improve [ ] Study or Investigate

No. 1 Action Plan: Substitution of Raw Materials

Task/Action Items	Responsible Part	Resource Needed	Project Start Date	Project Completion Dat	Comments (C)/Deliverables (D)
Identify list of suitable vendors that supply low VOCs paint	John Smith, Environmental Manager	MSDS Paint Mfg Assoc,	March 1, 2002	April 1, 2002	D – List of potential vendors of low VOC paint
Develop evaluation of technical feasibility and cost effectiveness of select paint products.	Cross Functional Team	Testing by paint personnel, customer approval	May 1, 2002	July 1, 2002	D – Comparative cost analysis of select low-VOC paint application D – Technical feasibility analys of select low-VOC paint application

Example 7 -1(Cont'd.): EMP for Reduction of Fugitive VOC, HAP, and Particulate Emissions

No. 2 Action Plan: Process Modification

Task/Action Items	Responsible Part	Resource Needed	Project Star Date	Project Completion Dat	Comments (C)/Deliverables (D)
Identify process modification that can be done to reduce emissions of VOCs, HAPs, and particualtes	John Smith, Environmental Manager	Eng. Dept, vendor proposals	August 1, 2002	August 31, 2002	D – List of potential process modification
Develop preliminary evaluation on technical feasibility and cost effectiveness of process modification alternatives	John Smith, Environmental Manager	Vendor quotes, est. of reductions from support agency	September 1, 2002	September 30, 2002	D – Technical feasibility report of process modification alternatives D – Comparative cost analysis of process modification alternatives
Conduct pilot test of the preferred alternative of process modification	Kim Weinstein, Environmental Department	Process and eng. dept	October 1, 2002	January 1, 2003	D – Workplan of the pilotett D – Weekly progress report of the pilot te D – Final report and recommendation
Full scale implementation	John Smith and Will Gibson (Paint Department)	Training by vendor, testing	February 2003		D – Quarterly progress and performance report

Your EMS Checklist for EMPs

- Have you established and maintained EMPs to achieve objectives and targets?
- Does your EMS manual provide a road map to, or include, the EMPs?
- Do you periodically review your EMPs?
- Do you have defined roles and responsibilities for environmental review of new projects or products? (example procedure in Guide)

Other Modules 8 to 18

- Implementation & Operation (8 to 14)
- Checking & Corrective Action (14 to 18)
- Management Review (18)

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

EMS Implementation & Operation

- Module 2: Structure and responsibility
- Module 8: Training, awareness, and competence
- Module 9: Communication
- Module 10: EMS documentation
- Module 11: Document control
- Module 12: Operational control
- Module 13: Emergency preparedness and response

Module 8: Training-- Cascading EMS Concepts

- Create top management awareness
- Train cross-functional team
- Train supervisors on EMS and environmental aspects of their departments
- Make all employees aware of the EMS and aspects associated with their jobs

EMS Training Pyramid

Module 9: Communication

Communication

- Establish procedures to report environmental activities internally and externally
- Communicate results of EMS audits and management reviews to all employees
- Create a system for receiving and responding to concerns (internal and external)
- Be proactive

Modules 10 & 11: EMS Documentation & Document Control

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

EMS Documentation

- Shall establish and maintain information
- Describe the core elements of the EMS and their interaction
- Provide direction to related documents

EMS Documentation Pyramid

EMS Documentation

- Level 1 — EMS Road Map
- Level 2 — Operational/Management Procedures
- Level 3 — Working Instructions (Specific how-to Procedures)

Effective Use of Words

Lord's Prayer	54 words
The Gettysburg Address	286 words
Ten Commandments	297 words
American Declaration of Independence	300 words
The Declaration of Independence	1,322 words
EEC Directive on Export of Duck Eggs	26,911 words
Government regulations on sale of cabbage	27,000 words

What EMS Documents Need To Be Controlled?

- ISO 14001 documents
- Emergency Preparedness and Response Documents
- Operational Controls
- Significant Environmental Aspects
- Which internal documents?
- Which external documents?

Module 12: Operational Controls

- Should be associated with significant environmental aspects and stipulate operating criteria
- Are documented procedures to cover situations where their absence could lead to a deviation from the environmental policy and the objectives and targets

Shipbuilding and Ship Repair: Environmental Management Systems Implementation (continued)

Operational Control Example

For storage of materials and wastes, prevent releases by having defined procedures and work instructions for:

- Loading and unloading
- Container integrity
- Material compatibility
- Secondary containment
- Prevention of storm water contact

Operational Control Example

See handout for example of an Environmental Operating Procedure/Work Instruction for Hazardous Waste Satellite Accumulation Areas that is in addition to one in the Implementation Guide for Control of Coating and Thinner Use

Link Between SEAs and Operational Controls

Significant Aspect	Objective	Target	Operational Control
Anti corrosive paint X	C-Maintain compliance	Ongoing	• Coating and thinning NESHAP procedure • Paint application work instruction (WI) • Bulk storage WI and containment WI
Non-abated emission of VOCs	I-Reduce VOC emissions	10% by January 2002	• VOC -reduction EMP
Solid waste from unmasking process	S-Investigate potential for reduction	Complete study by January 2002	• Solid waste reduction EMP

Table 12-1: Partial List of Typical Activity Areas and Operational Controls at Shipbuilding and Ship Repair Facilities

Category of Activity	Operational Control (Procedure)
Purchase of Raw Materials Tank Farm and Fuel Transfer	• Subcontractor Requirements • Above Ground Tank Inspection • Taking on Fuel • Spill Reporting and Clean-up • Secondary Containment Inspection
Storage Raw Materials (chemicals) and Hazardous Waste Accumulation	• Hazardous Waste Area Inspection • Bulk Storage and Containment • Containerized Material Storage • Foam Handling – Satellite and Warehouse Storage • Hazardous Waste Operations Procedure • Control of Discharge and Disposal • Waste Manifest/Chain of Custody • Bulk Cargo Transfer Inspection
Drydock Operation	• Best Management Practices for Ships in Dry dock • Drydock Maintenance
Wastewater Management	• Shipboard Wastewater Handling • Shipboard Sanitary Waste Disposal • Bilge and Ballast Water • Oily Water Transfer
Surface Preparation (Hydro and Abrasive Blasting) and Painting	• Hydroblasting Discharge Procedure • Air Emissions Control of Blasting • BMPs of Surface Preparation and Painting • Designated Material Mixing Areas • Errant Material Handling • Environmental Requirements for Distribution and Handling of Marine Coatings • Operational Controls for Control of Coating and Thinner Use
Shops and Facility Plant Maintenance	• Environmental Compliance Assessment Checklist • Procedure for Process Washing Near Water • Maintenance and Machine Shop Checklist • Disposition of Fluorescent Bulbs, Batteries, and Mercury Items

Tool 12-2: Sample Worksheet for Determining Which Operations or Activities Require Operational Controls

Operation or Activity with SEA to be Controlled	Procedure is Needed			No procedure is needed
	And Must Be Developed	Procedure Exists, but Must Be Documented	Exists and Is Documented	

Form 12-5: Sample Form for EMS Operational Control Procedures

SEA	Measurement Indicator(s)	Associated Job Functions	Existing Operational Control Procedures	Operational Control Procedures Development/ Modification Needed	Person Responsible / Status	Location Posted

Contact Person: Date Complete

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

Tool 12-4: Sample Worksheet for Training Plan for Operational Controls

SEA	Operational Control Procedure(s)	Person(s) Responsible for Procedure's Implementation	Training Needs	How to Train	When/ Length	Budget	Completion Date	Person Responsible for Training

Operational Controls Related to Contractors

Hold contractors accountable to the EMS policy and procedures

EMS expectations should extend to contractors!

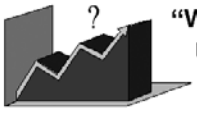
Module 13: Emergency Preparedness and Response

- Establish a procedure and controls to respond to unexpected or accidental incidents
- Should address:
  - Accidental emissions to the atmosphere
  - Accidental discharges to water and land
  - Specific environmental and ecosystem impacts from accidental releases

Checking and Corrective Action

- Module 14: Monitoring and measurement
- Module 15: Non-conformance and corrective and preventive action
- Module 16: Records
- Module 17: EMS audit

Module 14: EMS Monitoring and Measurement



"What gets measured gets managed; and what gets managed gets done"

Monitoring and Measurement

Monitor and measure actual performance

↓

Compare against objectives and targets

↓

Determine areas of success

↓

Identify activities requiring corrective action and improvement

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

Monitoring and Measuring Improvements

Measuring pollution discharges → **Measuring efficiency at process or production level**

Link Between SEAs and Monitoring and Measurement

Significant Aspect	Objective	Target	Operational Control	Monitoring and Measurement
Anti corrosive paint X	C-Maintain compliance	Ongoing	• Coating and thinning NESHAP procedure • Paint application work instruction (WI) • Bulk storage WI and containment WI	• Compliance audit • Regulatory reporting • EMS audits
Non-abated emission of VOCs	I-Reduce VOC emissions	10% by January 2002	• VOC - reduction EMP	• VOC volume reduction tracking metric • EMS audits
Solid waste from unmasking process	S-Investigate potential for reduction	Complete study by January 2002	• Solid waste reduction EMP	• Waste reduction tracking metric • EMS audits

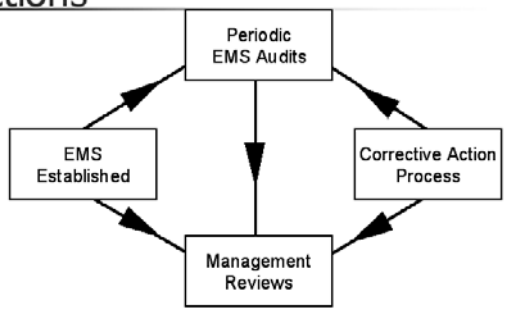
Goals for Monitoring and Measurement

- Tie to the business goals
- Make the metrics meaningful to top management
- Make the metrics understandable to the non-environmental audiences, both inside and outside of the company
- Tie to existing business metrics
- Use data already collected

Module 15: Corrective and Preventive Action and Records

- Establish procedures for handling non-conformance, mitigating any impacts caused, and initiating corrective action
- Establish procedures for maintaining records of training, audits, and reviews

EMS Audits and Corrective Actions



Module 17: EMS AUDIT

THE THREE C'S OF AUDITING AN EMS TO 14001
CONFORMANCE
Meets the requirements (implements the "shalls")
CONSISTENCY
Various elements inter-related (i.e., significant aspects reflected in emergency planning, etc.)
CONTINUAL IMPROVEMENT
Mechanisms in place to improve (including fixing non-conformances
and improving performance)

* You must audit the EMS for ALL three C's!

Shipbuilding and Ship Repair:
Environmental Management Systems Implementation (continued)

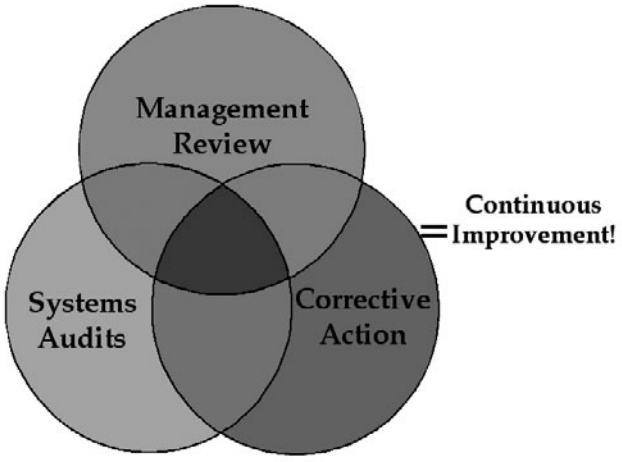
EMS Audits

- Use audits to identify performance improvement opportunities
- Select prescriptive, descriptive, and TQM approaches
- Schedule audit during production
- Talk to production/process staff

Continual Improvement

- Continual evaluation of the environmental performance of the EMS against:
  - Objectives and targets
  - The Policy

  for the purpose of identifying opportunities for improvement



Module 18: Management Review

- Top management should regularly review the EMS
  - Determine suitability, adequacy, and effectiveness
  - Evaluate EMS in terms of financial performance and competitive position
  - Address possible need for changes to policy, objectives, and other elements of EMS
- Goal is to improve overall environmental (and business) performance!