



LAUNCHING AN ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

This guidance document was prepared to assist small-to-medium sized facilities establish and maintain an Environmental Management System (EMS). These procedures were developed by the Arizona Department of Environmental Quality (ADEQ) Pollution Prevention (P2) Program.

DISCLAIMER

While this manual is written to provide assistance to individuals preparing an EMS, it does not replace the Arizona Revised Statutes, Title 49, Chapter 5, Articles 4 and 5. These requirements should be reviewed before using this guidance.

April 2014

Publication Number TM-14-01

TABLE OF CONTENTS

Module	Description	Page
	Glossary of Common Terms	1
	Overview of an EMS	2
I.	Launching an EMS	
	A. Introduction	4
	B. Requirements for a Successful EMS Program	4
	C. Developing an Environmental Policy	7
	D. Summary and the Next Step	8
II.	Developing an EMS	
	A. Introduction	9
	B. Development Procedure	9
III.	Facility Assessment	
	A. Introduction	13
	B. Gathering Facility Information	13
	C. Analyzing the Facility's Activities	13
	D. Analyzing the Facility's Property and Surroundings	15
IV.	Identification of Aspects and Impacts	
	A. Introduction	17
	B. Identification Process	17
V.	Analyzing Environmental Regulatory Requirements	
	A. Introduction	21
	B. Regulatory Assessment Process	21
VI.	Determination of Significance	
	A. Introduction	24
	B. Scoring of Criteria	24
VII.	Development of Objectives and Targets	
	A. Introduction	28
	B. Sample Process of Developing Objectives and Goals	28
	C. Summary	31
	D. Overview of Thought Process for Development of an EMS	31
VIII.	EMS Implementation	
	A. Introduction	34
	B. Developing Operating Procedures and Work Instructions	35
	C. Employee Training	40
	D. Communication	44
	E. Emergency Preparedness and Response	50

Module	Description	Page
IX	Record Keeping and Records	
	A. Purpose of System	55
	B. Type of System	55
	C. Type of Records	55
X.	EMS Feedback	
	A Introduction	58
	B Audit Program	58
	C. Audit Plan	59
	D. Developing an Audit Procedure	62
	E. Performing an EMS Audit	63
	F. Corrective Action	71
	G. Feedback Summary	76

Listing of Tables

Table	Description	Page
A.	EMS Responsibilities Matrix	6
B.	Sample Aspect/Impact Table	17
C.	Examples of Environmental Aspects	18
D.	Example of Environmental Requirements	22
E.	Guidelines for Sample Warehouse Operation	24
F.	Results of Scoring Aspects for Sample Warehouse Operations	25
G.	Objectives and Targets for the Nine Sample Aspects	30
H.	Tabulation of Entire Sample of EMS Process	32
I.	Aspects Needing Operational Controls	36
J.	Identification of Training Programs	42
K.	Internal Communication Plan	45
L.	External Communication Plan	48
M.	Emergency Response Plans	51
N.	Emergency Response Flowchart	52
O.	Sample Audit Schedule	60
P.	Sample Audit Sheet	64
Q.	Sample Audit Summary	71

These procedures are embedded within the body of the master document. All of the procedures begin with a double set of blue lines with red text in between. The remainder of the procedure text is in blue. They all end with a single red line and the words “end of procedure #EMS-?”

Listing of Procedures

Procedure	Description	Page
EMS-1	Developing an Environmental Management System	10
EMS-2	Writing Operating Procedures and Work Instructions	38
EMS-3	Employee Training and Tracking	42
EMS-4	Internal Communication Plan	46
EMS-5	External Communication Plan	49
EMS-6	Emergency Preparedness and Response Systems	53
EMS-7	Record Keeping and Records	56
EMS-8	Process for an EMS Audit	62
EMS-9	Investigating and Correcting Non-Compliance	72

GLOSSARY OF COMMON TERMS

In order to understand the descriptions used in this document, a list of common terms used throughout the text is shown below.

Environmental Management System (EMS): A formal set of procedures and policies that define how an organization will manage and reduce its impacts on the environment.

Developing an EMS: (1) The planning phase of the Plan – Do – Check – Act model, (2) a process which follows the steps outlined in the EMS development procedure, (3) a process which results in the formulation of environmental objectives and targets.

EMS Development Procedure: The framework and blueprint on how to set up an EMS. This procedure describes actions including (1) conducting facility assessment, (2) identifying aspects and impacts, (3) determining the significance of an impact, and (4) developing objectives and targets.

Environmental Aspect: An element of a facility's activities, processes, wastes, products, or services that can or does interact with the environment. An activity, process, waste, product, or service does not have to be regulated to be considered an aspect.

Environmental Impact: Any change to the environment, whether adverse or beneficial, due to a facility's activities, processes, wastes, products, or services.

Environmental Objective: An environmental goal, arising from the environmental policy, that a facility sets itself to achieve. An environmental objective is intended to reduce significant impacts, leading to improved environmental performance. Example of objective: to install a holding tank, piping, and pumping system in order to reuse treated water.

Environmental Target: A detailed environmental goal, arising from the environmental objectives, applicable to the facility or parts thereof. An environmental target needs to be scheduled and assigned in order to meet an environmental objective. Example of target: to reduce water use by 30 percent over baseline in a 12-month period.

Plan-Do-Check-Act Model: A cycle of activities that describes the content of an EMS.

Pollution Prevention (P2): Operational procedures, processes and improvements in housekeeping or management technique that reduce the potential or actual releases of pollutants to the overall environment including air, water, and land. P2 techniques include toxic use reduction; reduction at the source of a process by changing raw material, technology, product specification, and good operating procedures; and recycling of wastes through reuse or reclaiming/recovering valuable components from the waste.

OVERVIEW

Why launch an Environmental Management System (EMS)?

Environmental management is the manner in which a business administers its environmental affairs. A voluntary, simple EMS will produce a greener business model and can result in improved environmental performance. However, a more comprehensive EMS will be required for certification, including the International Organization for Standardization (ISO) 14000 certification.

An EMS represents a methodical, structured approach to environmental management. It adopts the classic management cycle of planning – doing – checking – acting. A business can implement the EMS cycle by using a variety of available techniques or by following established guidance manuals. The most widely used guidance is the ISO-14001 standard. The document you are reading mirrors the ISO-14001 overall standards, however, it is not intended for use for ISO certification, nor is it intended to provide specific interpretation of the ISO standards.

Arizona businesses with a certified Pollution Prevention (P2) plan may develop a voluntary, simple EMS through their current P2 planning processes. Although some businesses hire consultants to assist in developing an EMS, many companies have developed and implemented very strong programs internally. The time and cost of developing an EMS will vary by company and by the vitality of its existing environmental programs.

The U.S. Environmental Protection Agency (EPA), in cooperation with the National Sanitation Foundation International (NSF) published an EMS implementation guidance document to facilitate EMS development among small- and medium-sized businesses. This document can be found at: <http://nepis.epa.gov/EPA/html/DLwait.htm?url=/Exe/ZyPDF.cgi?Dockey=P1001VUV.PDF>

Some states such as North Carolina, Virginia, and Michigan provide web sites which are useful for implementing an EMS. Please refer to the following links:

www.p2pays.org/iso/tipstools.asp

<http://www.deq.state.va.us/AboutUs/EnvironmentalManagementSystem.aspx>

www.michigan.gov/deq/0,1607,7-135-3307_3666_4149-102117--,00.html

Many organizations have implemented a voluntary EMS similar to the ISO-14001 model without seeking registration. As this trend continues, it is important to determine if existence of an EMS is evidence of superior environmental performance.

A study by the University of North Carolina at Chapel Hill in 2003 attempted to determine the effects of implementing an EMS on a facility's environmental performance, regulatory compliance, and economic performance. The study provided the following conclusions:

- * Introduction of an EMS resulted in improved environmental performance. Greater improvements were observed when there was greater motivation for adopting an EMS. In addition, facilities that had already developed formal internal capabilities for EMS adoption such as prior continual improvements or P2 plans improved more than those that did not.

* The effects of EMS introduction on regulatory compliance rates were inconclusive because of small sample size. However, compliance awareness was improved due to the adoption of the EMS.

* The cost-benefit comparison showed favorable economic impact for some facilities. Although 75 percent of the facilities were not able to identify any quantitative monetary benefits from their EMS during the first two years of implementation, the remaining 25 percent reported an average benefit of \$90,320. Of those, the highest was \$1,217,000, while the lowest was \$24,000. The median reported cost for EMS adoption was approximately \$64,000. The highest reported cost was \$273,000 and the lowest was \$3,000.

* Significant qualitative benefits include increased management efficiency, increased operational efficiency, reduced liability, and regulatory benefits.

Some major businesses, such as car makers in the United States, have already mandated that their first-tier suppliers implement a certified EMS. This initiative will have a ripple effect as first-tier suppliers issue a similar requirement for their suppliers.



The study has shown that an EMS is good for business, the environment, and the community. An EMS is a powerful management tool that can transform a business into a more competitive enterprise. As many organizations start or continue to operate internationally, an EMS will be a great asset for those exporting their products to the global community.

Module I

Launching an EMS

A. Introduction

In this Section, “Launching an EMS” refers to the following three components necessary to start an EMS:

Raise Management Awareness

Management commitment is a vital pre-requisite for a successful EMS. The commitment comes after management is well informed about the costs and benefits of implementing an EMS. This cost-benefit issue is outlined briefly in the introductory section of this guidance.

Appoint an EMS Team

Appointment of an EMS team reflects management’s support and commitment to provide resources. Section I-B outlines five essential, sequential steps for EMS team implementation.

Create an Environmental Policy

Creation of an environmental policy is necessary as a guide for the facility’s EMS. This policy should be developed and signed by management as outlined in Section I-C.

B. Requirements for a Successful EMS Program

Management commitment and employee motivation are vital components for a successful EMS. Each step outlined below accomplishes action items in a sequential manner that builds upon the success of the previous step.

Step 1: Acquaint Management with EMS Concept

This is a crucial step in launching an EMS. Management will not commit unless it is well informed and aware of the costs and benefits of implementing this system. Once the advantages of an EMS are realized, management is more likely to make a commitment and provide ongoing leadership for its development and implementation. Top-down loyalty to the EMS concept is vital for following through with other steps, as well as the cooperation and expertise of other necessary staff members further on in the process. This leads us to an action step that shows how serious management is about making an EMS a priority.

Step 2: Obtain Written Commitment

A written statement from management indicating willingness to commit time, people, and financial resources to the development of an EMS is a good start. This written statement can take the form of a mission or policy statement. It should be dated, signed by

management, and reflect the company's business philosophy, its values, and priorities. The following is an example of this type of written statement, but further details can be included as appropriate.

<p style="text-align: center;">Management Commitment to Development of an Environmental Management System (EMS)</p> <p style="text-align: center;">XYZ Company</p> <p>Our company is committed to producing products and services with the least possible impact on the environment. We plan to do this by providing the time, personnel, and financial resources for the development and implementation of an Environmental Management System.</p> <p>Signature: _____ Date: _____ (Title)</p>

Step 3: Raise Employee Awareness and Gain Participation

This step is extremely important to the success of the EMS. Management needs to fully communicate its intent to begin an EMS to all employees throughout the company by various methods. Employee motivation is directly correlated to awareness and participation. The written statement should be posted in various locations in the facility, and or distributed by other communication means. Most importantly, it should be openly discussed with all employees. This will ensure that employees are aware that management is serious about implementing an EMS and that staff will be called upon to be part of this important process.

Internal communication and employee training are two of the areas that will be addressed by the EMS team in the development of an EMS. In the sample responsibility matrix, on pages 6 and 7, those are tasks #7 and #9. Further explanations of these tasks will be included in Module III.

Once the facility has documented and signed a statement of management commitment and has communicated this intent to all employees, the facility is ready for the fourth step.

Step 4: Appoint an EMS Team

The team should be led by a qualified team leader who will eventually assume the role of an EMS manager. Management should look across all necessary job titles and ranks to appoint team members who are well versed in their respective areas. EMS team members should include expertise in various functions such as facility operations, maintenance, engineering, risk management, manufacturing, human resources (HR), finance, and quality control. Members should be dedicated employees, who are genuinely interested in the EMS, and open to implementing change.

Management can formalize the appointment of an EMS team by signing an internal memo that specifies the name of individuals chosen to be on the team and who will lead and promote the effort to develop and implement the facility's EMS. Copies of the memo should be distributed throughout the company using appropriate communication methods so employees are aware of the progress of the EMS initiative. Please note that for a very small business, all employees can be members of the EMS team.

Once established, the team will meet regularly. For the first team meeting, discuss the task of the team and what roles each team member will play. The initial task of the team will be to develop and implement an EMS for the facility.

A comprehensive EMS is an EMS that follows the ISO-14001 standards which covers 17 elements. They are:

- | | |
|---------------------------------------|---|
| 1. Environmental policy | 10. Operational control policy |
| 2. Environmental aspects and impacts | 11. Emergency preparedness and response |
| 3. Legal and other requirements | 12. Monitoring and measurement |
| 4. Objectives, targets, and programs | 13. Evaluation of compliance |
| 5. Structure and responsibility | 14. Non-conformance, corrective and preventive action |
| 6. Training, awareness and competence | 15. Records |
| 7. Communication | 16. EMS audits |
| 8. EMS documentation | 17. Management review |
| 9. Document control | |

In the following example, the team agrees to adopt a simple EMS responsibilities matrix. Although the format is simplified, the scope still reflects the ISO-14001 requirements. This chart displays the roles of each team member in developing the facility's EMS and ensures that team members know their tasks and roles in the process. This sample matrix can be cut and pasted into a company document and edited as needs dictate.

Table A – EMS Responsibilities Matrix

No.	Area of Responsibility	Josh	Jill	John	Jean	Jim
1.	EMS management	Lead				
2.	Environmental policy	Lead	✓	✓	✓	
3.	Legal requirements; Evaluating compliance	Lead	✓	✓	✓	
4.	EMS planning: A. Process flowcharting B. Environmental aspects and impacts C. Objectives and targets	Lead	✓	✓	✓	✓
5.	Operations: A. Operational control B. Monitoring and measurement	✓	✓	✓	Lead	✓

Table A (cont.)

No.	Area of Responsibility	Josh	Jill	John	Jean	Jim
6.	Record management	Lead	✓	✓	✓	✓
7.	Employee training	✓	Lead	✓	✓	✓
8.	Emergency preparedness and response	✓	✓	Lead	✓	✓
9.	Internal and external communications	Lead	✓	✓	✓	✓
10.	EMS audits; Corrective and preventive action	Lead	✓	✓	✓	✓
Signature: _____ Date: _____						

C. Developing an Environmental Policy

The environmental policy is a document containing a facility’s commitments and principles concerning environmental management. The environmental policy is essential because it serves as a guide for the facility’s EMS and provides a framework on which the facility will operate environmentally. It should effectively communicate the facility’s mission and values and have full support of the Management team. Management involvement is critical in the development of the policy since the EMS will need to be fully integrated into the company business practices.

The EMS team or one team member can write a draft policy. The policy must be simple so that all employees can understand it, yet inclusive enough that it encompasses the proper components. The draft policy should be made available for employee comment and rewritten as necessary based on employee input. Once completed, management should review, comment, and/or approve.

An EMS environmental policy must contain at least the following three commitments:

1. Promote pollution prevention
2. Comply with relevant environmental laws and regulations
3. Focus on continual improvement

An EMS environmental policy could begin with the language from the original written commitment and further expand on the three commitments shown above. A sample of a simple EMS environmental policy could be:

“Our company is committed to producing products and services with the least possible impact on the environment. We plan to do this by implementing pollution prevention, complying with relevant environmental laws and regulations, and seeking ways to

continually improve our business practices so that we minimize our impact on the environment.”

A facility, however, may want to develop a policy that focuses on its unique attributes or specific intentions. One or more of the samples listed below might be included or modified to fit an EMS environmental policy:

“We pledge to reduce our use of toxic substances and to minimize the generation of hazardous wastes whenever feasible.”

“We will prevent pollution at the source. When waste cannot be avoided, we are committed to recycling, treatment and disposal in ways that minimize undesirable effects on air, water and land.”

“We will train our employees to be environmentally responsible at work and at home and will also communicate our commitment to environmental stewardship to our vendors, customers, and surrounding communities - and solicit their input in meeting our environmental goals.”

“We will encourage and support employee participation in preventing pollution, and achieving compliance and continual improvement.”

“We will include environmental requirements in product planning and designing activities.”

“We will include environmental factors when making purchasing and operating decisions.”

“We will resolve environmental-related problems which may have been created by past operations or handling of materials.”

D. Summary and Next Step

The completion of an EMS-based environmental policy document by the EMS team and the signing of the policy by upper management is a significant achievement. Remember that management needs to be actively involved and lend full support to the entire process, especially in the beginning stages.

Various communication techniques should be used to ensure employees are fully aware of the process and involved during the development of the policy. Employee participation will be important as the EMS is implemented and will be necessary for its success.

When management is committed to the EMS and employees are motivated to become involved in the program, the next step for the EMS team is to develop the EMS.

Module II

Developing an EMS

A. Introduction

This section facilitates development of a simple EMS. An EMS can be visualized as a Plan – Do – Check – Act model. Within this context, developing an EMS represents the planning phase of the model and covers the following four planning components:

1. Environmental policy
2. Environmental aspects and impacts
3. Legal and other requirements, and
4. Objectives and targets

An EMS helps a facility manage its activities, processes, products, or services that interact with or impact the environment. The following five steps are necessary in order to develop an EMS.

1. Identify activities, processes, products, or services of your facility.
2. Determine aspects of these activities, processes, products, or services that can interact with or impact the environment.
3. Document which aspects have environmental regulatory requirements.
4. Evaluate which aspects have significant impacts using a rating system that you develop.
5. Develop objectives and targets to manage those significant impacts.

The planning or development phase of an EMS is complete after the identification of legal requirements, determination of environmental aspects/impacts and development of objectives and targets.

This planning stage is vital to the EMS. It helps determine what to monitor and control to reduce environmental impact. Objectives and targets should be updated periodically as goals are completed. At a minimum, an EMS should be reviewed annually.

As part of developing an EMS, the procedure that will be followed should be documented for consistency. When the annual review is completed, (which involves reconfirming significant aspects of the facility's operation and progress made against objectives and targets), the procedure document should be reviewed as well.

B. EMS Development Procedure

The following is an example of a procedure that could be used to develop an environmental management system:

Procedure No: EMS-1
Issue Date: January 1, 2013
Revision No: Original (1, 2, 3 as changes are made)
Title: Developing an Environmental Management System (EMS)
Approved By: John Doe (name of final approver)

1. Purpose

This procedure is developed to establish the planning elements of an EMS. It involves identification of the environmental aspects of this facility's activities, processes, wastes, products, and services that have significant environmental impact; and to develop objectives and targets for reducing those impacts.

2. Scope

2.1. This procedure will be used to identify activities, processes, wastes, products, and services of the facility and to establish a methodology for determining significant impacts.

2.2. A multifunctional team (i.e., a team consisting of representatives from different parts of the facility) should participate in the identification of aspects and impacts. This team is the EMS team. The chances of identifying all environmental impacts is increased by including representatives from the entire organization

2.3. Criteria for evaluation of significant impacts can include regulatory requirements, estimated impact on the environment, legal liability, public risk, mitigation costs, and frequency, severity, and ability to control the impact. The EMS team will need to choose a rating methodology using these or other criteria.

2.4. Using a chosen rating methodology, objectives and targets for significant impacts will be developed that promote pollution prevention, environmental compliance, and continuous improvement as stated in this facility's environmental policy.

2.5. Objectives and targets will be developed by assigned personnel responsible for the program, and progress measured over time. The EMS manager will oversee this process.

3. Responsibilities

3.1 EMS Manager - works with the EMS team and all employees to identify aspects, determine significant impacts, and develop objectives and targets.

3.2 EMS Team - composed of representatives from all operational areas of the facility to identify and rank environmental aspects and impacts. This team ensures on-going development and refinement of the EMS.

3.3 Upper Management - approves objectives and targets.

3.4 Environmental Program Managers - responsible for achieving objectives and targets and developing the means and time frames to complete them.

4. Definitions

4.1 Environmental Aspect - any element of a facility's activities, processes, wastes, products, or services that can interact with the environment. An activity, process, waste, product, or service does not have to be regulated to be considered an aspect.

4.2 Environmental Impact - any change to the environment due to a facility's activities, processes, wastes, products, or services. These changes can be positive or negative.

4.3 Environmental Objective - an environmental goal, arising from the environmental policy. An environmental objective is intended to reduce significant impacts, leading to improved environmental performance. Example of an environmental objective: Install a holding tank, piping, and pumping system to reuse treated water.

4.4 Environmental Target - a detailed environmental goal, arising from an environmental objective, applicable to the facility or parts of the facility. An environmental target typically sets specific numerical goals or timeframes in order to meet an environmental objective. Example of an environmental target: Reduce water use by 30 percent over baseline in a 12-month period.

5. Procedure

5.1 Environmental aspects (inputs) will be identified by the EMS team and determined by screening of activities, processes, wastes, products, and services that interact with the environment. The following aspects will be considered: use of chemicals, water, and energy; air emissions, wastewater discharges, and solid/hazardous waste generation.

5.2 Environmental impacts will be identified by the EMS team. Consider the impact in terms of effect or output on the environment. The identified aspects and their environmental impact will be tabulated for significance (Table A). The following are impacts associated with aspects. Unless explicitly stated, these are negative impacts: depletion of resources (e.g. chemicals, water and energy), degradation of air quality, degradation of water quality including storm water pollution, disposal of solid/hazardous waste and contaminated groundwater or soil.

5.3 Once environmental aspects are identified along with their associated impact(s), a methodology or criterion for scoring is used to quantify this relationship. The following criteria can be used to determine the significance of the impacts:

Use of natural resources (chemicals and other materials, water, energy)
Generation of hazardous waste
Generation of solid waste
Generation of wastewater
Emissions to air
Activity is regulated
Cost to mitigate
Employee and public concern
Frequency of occurrence
Severity of impact

Impacts with the highest scores will be considered the most significant impacts.

6. Updates and Reviews

Aspects, objectives and targets will be reviewed and updated annually. Updates will also be required for any addition or modification to an activity, process, product or service. Changes to the criteria for determining aspects and significant impacts must be recorded in the facility's aspect procedure.

7. Records

Records generated from this procedure include, but are not limited to, flowcharts, a list of aspects and impacts, aspect analysis, legal requirements, and objectives and targets.

End of Procedure EMS-1

Module III

Facility Assessment

A. Introduction

When developing an EMS, it may be helpful to first complete a facility assessment. The first article in Procedure EMS-1 requires the facility to identify and rate aspects of the facility's activities, processes, wastes, products, or services that interact with the environment. A good first step in identifying aspects and impacts is to understand what the facility does. This includes collecting facility information and analyzing the facility's manufacturing processes. The identification and rating of the aspects should be conducted by the EMS team.

B. Gathering Facility Information

The following questions are important to answer when starting an assessment:

1. What processes are currently active; Which are inactive?
2. Where are incoming materials and products stored?
3. What types of wastes are generated and how are they managed?
4. What operational flow charts or reports, process diagrams and engineering drawings are available?

The above and other relevant information can be obtained from the facility's files, from talking with employees and from walking around the facility. Some of the aspects that will be identified will include:

1. Raw materials, water use, and energy consumption
2. Solid and hazardous wastes generation
3. Wastewater discharges
4. Air emissions
5. Surrounding land use, and potential for spills and contamination
6. See Table A for a list of other possible environmental aspects that may be found at a facility

C. Analyzing the Facility's Activities

Flowcharts are useful tools that can be used when conducting a facility assessment. The flowcharts can depict the general processes that occur at a facility or depict specific processes. A simple flowchart for the whole facility (which starts from the introduction of raw materials at the point of entry to the shipment of finished products) may look like Figure 1.

Figure 1 – Facility Process

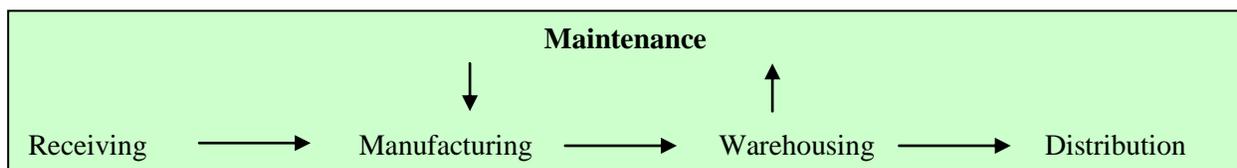


Figure 1 shows that the facility process consists of five sub-processes: receiving, warehousing, maintenance, manufacturing, and distribution. Each sub-process is called a unit of operation.

Once the units of operation are determined, the EMS team will create a flowchart for each unit. This flowchart is a visual aid for depicting work processes and shows how inputs, actions, and outputs are linked. A typical flowchart connecting the inputs (hazardous materials, other materials, water, and energy), the actions (facility processes) and the outputs (products and services, solid and hazardous wastes, wastewater generation, air emission, and storm water) is shown in Figure 2.

Figure 2 – Typical Operational Unit Flowchart

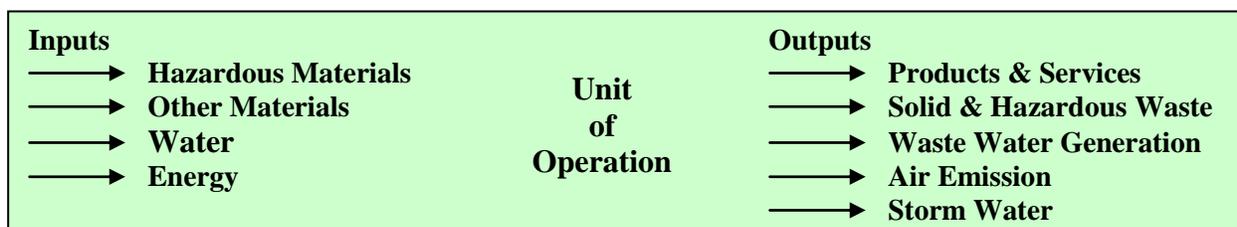
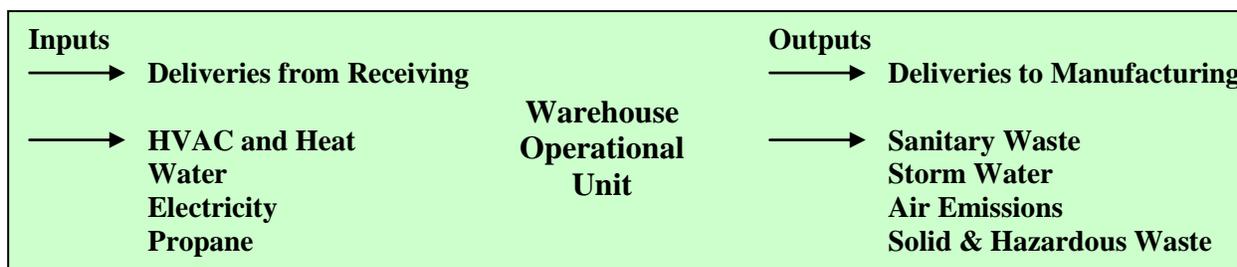


Figure 3 is an example of a flowchart for a warehousing operational unit. It consists of inputs in the form of incoming deliveries via trucks from the receiving operational unit and the consumption of resources, such as heating and air conditioning (HVAC), water, electricity, and propane (to power the forklift). The outputs are outgoing deliveries to the manufacturing operational unit and environmental pollutants. Environmental pollutants include solid and hazardous wastes (from packaging and forklift used oil respectively), wastewater discharges, air emissions, and potential chemical spills and releases. Outputs from activities are synonymous with aspects **if they interact with the environment**.

Figure 3 – Warehousing Operational Unit Flowchart



If a facility has current process diagrams or flowcharts, they should be reviewed. If no diagrams or flowcharts are available they can be created. Identification of the following items can help with flowchart development:

1. Equipment such as electrical transformers and monitoring equipment which may contain polychlorinated biphenyls (PCBs), radioactive, or other regulated materials.
2. Auxiliary service equipment such as air compressors, boilers, cooling towers, HVAC, refrigerators, air handling systems, and heat exchangers that consume resources and possibly generate pollutants.
3. Containers and packaging, waste streams from production, maintenance activities, and remedial projects can also be sources of pollutants.
4. Storage tanks (above ground or underground), piping systems (for fuels and chemicals), drainage systems and storm water discharge conduits, wastewater treatment systems, water sprays, sumps, hoods, vents, stacks, paint booths, dumpster, and waste storage areas.

If a facility generates wastes that are not included in the flowcharts, separate descriptions can be provided below the flowchart.

The use of a cross functional team to evaluate a facility's operation is essential to ensure all activities and outputs are identified.

D. Analyzing a Facility's Property and Surroundings

The facility and surrounding areas should be analyzed to evaluate conditions that may warrant public concern from interested parties (for example environmentally sensitive areas or areas of high population density should be noted). These conditions should be included on a facility map.

A tour of the facility and surrounding areas can be used to collect the required information. Some items that can be noted include:

1. Information about the facility:
 - *Physical conditions and the age of the buildings
 - *Unidentified pipes and stacks
 - *Chemical storage area
 - *Past chemical and waste handling and storage areas
 - *Waste storage area
2. Information about the surrounding area:
 - *Land use of the area immediately bordering the facility; identified and also categorized as residential, commercial, industrial, or agricultural when appropriate.

- *Distance between the facility and the closest residential area.
- *Location of nearby recreational facilities or conservation areas.
- *Location of nearby ditches, streams, rivers, or lakes.
- *Storm water runoff patterns.

Module IV

Identification of Aspects and Impacts

A. Introduction

The facility assessment process described in Module III provides sufficient information for the facility to continue with the identification of aspects and impacts. This means charting how the facility interacts with and impacts the environment, either positively or negatively.

B. Identification Process

The identification process is relatively simple:

1. Look at the inputs and outputs of each of the flow charts previously completed and determine if there is an output that interacts (or has the potential to interact) with the environment.
2. Determine the impact on the environment based on the outputs (or aspects) identified.
3. List the aspects and impacts for each activity, process, product, and service, in a tabular form. Please note that there might be more than one aspect and impact for each activity, process, product, and service. A sample aspect/impact table is provided below in Table A.

Table B – Sample Aspect/Impact Table

Activity, Process, Product, Service	Aspect	Impact
Warehousing	Electricity use	*Depletion of energy resources
	Ventilation emission	*Degradation of air quality (carbon dioxide or freon)
	Wastewater discharge	*Discharge of wastewater to publicly owned treatment works (POTW) *Depletion of resources (water)
	Chemical spill potential (due to unloading and transfer operations)	*Storm water contamination
	Generation of solid waste (due to packaging)	*Disposal of solid waste *Depletion of resources

Table B (cont.)

Activity, Process, Product, Service	Aspect	Impact
Maintenance	Use of paints and solvents	* Depletion of raw material * Disposal of used paints and solvents
	Use of oils	* Depletion of raw material * Disposal of used oil
	Oil spill potential	* Soil, groundwater, and storm water contamination
	Underground storage tank (UST) leak potential	* Soil, groundwater, and storm water contamination
	Vehicle refueling emission	* Degradation of air quality
	Refueling spill potential	*Storm water contamination
Boiler	Use of fuel oil from above ground storage tank (AST)	*Depletion of raw material
	Fuel oil spill (potential)	*Soil, groundwater, and storm water contamination
	Air emission	*Degradation of air quality
	Use of chemicals for treating water and boiler blow down	*Depletion of raw material * Storm water pollution from blow down
	Chemical spill (potential)	*Contamination of water discharges
	Wastewater generation (due to normal operation)	*Wastewater discharge (to city POTW)

The aspects in the above table are specific to our sample company; however each facility needs to look at their own activities, products, service or processes to insert into the chart when determining aspects. Following are some examples of additional aspects.

Table C – Examples of Environmental Aspects

Activity, Process, Product, Service	Aspects	
Cafeterias	Utensils and cooking supplies Waste grease Food products	Food waste Packaging and plastic wrap
Cutter Grind	Electrolyte salts	Emissions to dust collector

Table C – (cont.)

Activity, Process, Product, Service	Aspects	
Fire Protection	Baking Soda Spill control agent	Used spill control agent Waste personal protection equipment (PPE)
Heat Treat Furnace	Air emissions Solid carbon	Ammonia
Janitorial	Sanitary waste to sewer Hand soap and lotion	Floor soap Cleaning chemicals
Laboratory	Glycerin Glass waste Hexane Lab packs	Liquid nitrogen Metal polish Mineral spirits
Machining Aluminum	Filter media with lead waste Aluminum	Aluminum parts
Machining Bronze	Lead waste	Bronze
Machining Steel	Deburr air emissions Spent deburr brushes Spent polishing tape	Steel Steel parts
Maintenance	Natural Gas Compressor oil Ethylene glycol Fertilizer Paints and solvents Cans	Paint related materials Paint booth emissions Adhesive Polyvinyl chloride glue Water/air filters
Manufacturing	Chemicals Waste chemicals Air emissions	Wipers Energy/electricity Fuel
Medical	Infectious waste Medical supplies	
Office	Paper Energy/electricity Waste paper copy Developer copy fuser	Lubricant copy toner Used copy toner Toner cartridges
Oil Storage Yard	Oil containers Bottled gas	Degreaser Plastic containers
Power House	Standby fuel oil Boiler emissions Coal Residual	Ash particulates Pipe insulation waste Reagents Salt

Table C – (cont.)

Activity, Process, Product, Service	Aspects	
Press room	Corn cob Corn cob waste Dust from sanding	Walnut shell Walnut shell waste Air emissions (particulates)
Shipping and Receiving	Spent air filters Cardboard waste Used gloves Plastic waste Used rags Wood pallets	Styrofoam waste Steel Shot waste Tumbler media waste Stubs of welding rods Trash
Storm Water Treatment	Screenings	Effluent
Surface Preparation	Spent blasting media Air emissions (particulates) Acids and solutions	Spent acids and solutions Wastewater
Wastewater Treatment	Air scrubber emissions Anionic polymer Cationic polymer Desiccant cartridges Waste desiccant cartridges Grit screenings Wastewater effluent	Phosphoric acid Process sludge Tank cleaning sludge Sodium hydroxide Skimmings Sulfuric acid
Welding	Weld spatter Flux	Wire feed

Module V

Analyzing Environmental Regulatory Requirements

A. Introduction

To adhere to compliance with environmental laws and regulations, it is necessary to know what the legal and business requirements of the EMS are for the facility. Although this EMS focuses on environmental compliance, a facility can add the provisions required by the Occupational Safety and Health Administration (OSHA).

The environmental policy should address pollution prevention, environmental compliance, and continuous improvement.

1. The environmental requirements include:
 - *Federal requirements
 - *State requirements
 - *Municipal requirements
 - *Environmental permitting
 - *Compliance monitoring
 - *Record keeping and reporting
 - *Contingency plans
2. The OSHA requirements may include:
 - *Process Safety Management
 - *Association initiatives, such as the Chemical Manufacturer's Association (CMA) Responsible Care Program
 - *Industrial practices

B. Regulatory Assessment Process

The following activities will help the environmental regulatory assessment process. Even though information will be summarized in a spreadsheet, it may be helpful to the EMS team to maintain a copy of some of these documents in the event detailed information is needed further into the EMS process.

1. Identify individuals responsible for environmental compliance at the facility. Specify areas of responsibility for each person.
2. Identify contractors who provide environmental services to the facility. Indicate the type of service they offer. Their activities may be regulated.
3. Identify regulatory agencies that the facility would contact for information. Include the names of the contact person, phone number, and email address.

4. Identify all environmental permits possessed by the facility. Provide essential information for each of the permits, such as permit type, permit number, issuing authority, issue date, and expiration date.
5. Identify any legal orders against the facility. Describe the type of order (e.g. consent order, consent judgment, notice of violation, notice of opportunity to correct), issuing authority, issue date, and required action by the facility.
6. Identify reports, plans, and other documents the facility is required to submit or maintain. These may include emergency spill plans, discharge monitoring records, site remediation plans, pollution prevention plans, pollution prevention progress reports, toxic release inventory forms, hazardous waste manifests, hazardous waste annual reports, etc. Specify the type of the reports, agency requiring it, and frequency of reporting.
7. Identify specific programs and procedures under which the facility operates. The list may include the facility's standard operating practices, pollution prevention recycling, process safety management, responsible care, EMS, or ISO-9000 programs. Include the names of the program, initiation date, and person responsible for the program.

Once all of the above information is obtained, tabulate the information in a simple spreadsheet for easy use. It can be very helpful to list all environmental aspects and, if they are regulated, the associated regulation. Table D can help with this exercise.

Table D – Example of Environmental Requirements

Aspect	Requirements	Citation
Material Storage and Use	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)'s	40 CFR Part 302
	Hazardous Substances and Reportable Quantities	40 CFR Part 370
	Superfund Amendments and Reauthorization Act (SARA) Title III Hazardous Waste Reporting – Community Right to Know	40 CFR Part 372
	SARA Title III Toxic Chemical Release Reporting – Community Right to Know	A.R.S. §49-1001 – 1094

Table D (cont.)

Aspect	Requirements	Citation
Air Emissions	Federal Air Quality	40 CFR Parts 50 – 99
	Chlorofluorocarbon (CFC) Containing Equipment	40 CFR Part 82
	State Air Quality Permit	A.R.S. §49-421 – 467
Water Discharges	Discharge of Oil	40 CFR Part 110
	Spill Pollution Control and Counter - measures (SPCC)	40 CFR Part 112
	State Wastewater and Storm Water Discharge Permit	A.R.S. §49-255
	Test Procedures for Analysis of Pollutants	40 CFR Part 136
Solid and Hazardous Waste	State Aquifer Protection Permit	A.R.S. §49-241 - 252
	City Water & Sewerage Permit	City Ordinance
	Hazardous Waste	40 CFR Parts 264-265 40 CFR Parts 264-268
	Used Oil Management Standards	40 CFR Parts 264-279
	Toxic Substance Control Act	40 CFR Parts 700
	PCB Waste Management	40 CFR Parts 761
	Asbestos Management	40 CFR Parts 763
	Solid Waste Management	A.R.S. §49-701 – 881
	Medical Waste	A.A.C. R18-13-1401 through 1420

Module VI

Determination of Significance

A. Introduction

As illustrated in Table B, some aspects of the facility operation may result in positive or negative impacts to the environment. The role of an EMS is to address and control any adverse environmental impacts created by the facility operation. These are known as the significant impacts. An aspect which causes a significant impact is termed a significant aspect.

The EMS team helps determine significant impacts by using certain criteria. The criteria identified in Module II, Part 5.3 of the sample EMS Development Procedure are typical for significant impact determination.

Once an impact is evaluated by appropriate criteria, a total score for that impact can be obtained.

B. Scoring of Criteria

In the sample warehouse operation (Figure 3) example, due to the unloading and transfer operations, there is a potential for chemical spills which can result in storm water contamination, an adverse environmental impact. This facility has chosen the following criteria:

1. Loss of chemicals (depletion of resources)
2. Generation of waste (amount of waste generated)
3. Activity is regulated (permit or operational requirements)
4. Land contamination (potential cost to mitigate)
5. Employee and public concern (interested parties)
6. Frequency of occurrence

The EMS team then assigns a rating to each of the above criteria by using a rating system based on the following guidelines:

Table E – Guidelines for Sample Warehouse Operation

Criteria	Guidelines	Score
Depletion of Resources	> 55 gallons	Score = 3
	10 – 54 gallons	Score = 2
	5 – 9 gallons	Score = 1
	< 5 gallons	Score = 0
Amount of Waste Generated	> 55 gallons	Score = 3
	10 – 54 gallons	Score = 2
	5 – 9 gallons	Score = 1
	< 5 gallons	Score = 0

Table E (cont.)

Criteria	Guidelines	Score
Regulated	If Yes If No	Score = 3 Score = 0
Cost to Mitigate	> \$100,000 \$10,000 – \$99,999 \$1,000 – \$9,999 <1000	Score = 3 Score = 2 Score = 1 Score = 0
Interested Parties	If Yes If No	Score = 3 Score = 0
Frequency of Occurrence	> 6 times/year 3-5 times/year 1-2 times/year None	Score = 3 Score = 2 Score = 1 Score = 0

The following shows the score resulting from the potential chemical spills (depletion of resources) during unloading or transfer operations.

- | | |
|---|----------------|
| 1. Loss of chemicals | Score 1 |
| 2. Amount of waste generated = 50 gallons | Score 2 |
| 3. Permit for site cleanup is required | Score 3 |
| 4. Cost to clean up site contamination = \$50,000 | Score 2 |
| 5. Interested parties = none | Score 0 |
| 6. Frequency of occurrence = once a year | <u>Score 1</u> |

Total Impact Score 9

The total score that reflects the significance of this environmental impact is 9. This scoring system is repeated for the remaining aspects and the result of the exercise is then tabulated. The following table illustrates the tabulation results for warehousing, maintenance, and boiler activities of our sample warehousing company.

Table F – Results of Scoring Aspects for Sample Warehouse Operation

Activity, Process, Product, Service	Aspect	Depletion of Resources	Amount of Waste Generated	Regulated	Cost to Mitigate	Interested Parties	Frequency	Total Score
Warehousing	1. Electricity use	3	0	3	0	3	3	12
	2. Ventilation emission	0	2	3	1	3	3	12

Table F (cont.)

Activity, Process, Product, Service	Aspect	Depletion of Resources	Amount of Waste Generated	Regulated	Cost to Mitigate	Interested Parties	Frequency	Total Score
	3. Wastewater Discharge	3	3	0	0	0	0	6
	4. Chemical Spill Potential	1	2	3	2	0	1	9
	5. Generation of Solid Waste	2	3	3	0	3	3	14
Maintenance	6. Use of Paints and Solvents	3	1	3	0	3	3	13
	7. Use of Oils	2	1	0	0	0	3	6
	8. Oil Spill Potential	1	2	3	2	0	1	9
	9. UST Leak Potential	3	3	3	3	3	1	16
	10. Vehicle Refueling Emission	0	0	0	0	3	3	6
	11. Refueling Spill Potential	1	2	3	1	0	2	9
Boiler	12. Use of Fuel from AST	3	1	3	0	3	3	13
	13. Fuel Oil Spill Potential	1	2	3	1	0	1	8
	14. Air Emission	0	2	3	1	3	3	12
	15. Boiler Blowdown	3	3	3	0	3	3	15
	16. Chemical Spill Potential	1	2	3	3	0	1	10
	17. Wastewater Generation from Normal Operation	3	2	3	0	3	3	14

After all aspects are scored, the EMS team decides what score represents a significant impact. Table F shows that the total score for each aspect ranges from six to 16. If the facility decides that any number greater than 11 represents a significant impact, then the following nine out of the 17 aspects are considered having significant impacts.

Warehousing:

- | | |
|------------------------------|------------|
| 1. Electricity use | Score = 12 |
| 2. Ventilation emission | Score = 12 |
| 5. Generation of solid waste | Score = 14 |

Maintenance:

- | | |
|-------------------------------|------------|
| 6. Use of paints and solvents | Score = 13 |
| 9. UST leak potential | Score = 16 |

Boiler:

- | | |
|---|------------|
| 12. Use of fuel from AST | Score = 13 |
| 14. Air emission | Score = 12 |
| 15. Boiler blowdown | Score = 15 |
| 17. Wastewater generation from normal operation | Score = 14 |

Module VII

Development of Objectives and Targets

A. Introduction

Objectives and targets are developed to address aspects that have significant impacts. They should support the environmental policy which promotes pollution prevention, environmental compliance, and continual improvement. Objectives and targets must be based on technological options, economic feasibility, views of interested parties, and legal considerations. The development of objectives and targets should be conducted by EMS team members who are related to the affected activities.

An objective is a goal that the facility sets to achieve in order to minimize significant impacts. An example would be to install a holding tank, piping, and pumping system in order to reuse treated wastewater.

A target is a detailed goal, with quantitative measurement and a time frame to achieve the goal. An example would be to reduce water use by 30 percent over baseline in a 12-month period. Included in the decision of setting targets is the assignment of staff responsibility for each target. Please note that the actual achievement of a target requires commitment and coordination from multifunctional departments, but one responsible person has to direct the effort.

B. Sample Process of Developing Objectives and Goals

In our example, the EMS team has decided to consider the following four aspects for the boiler which are considered to have significant impacts: use of fuel; air emissions; use of chemicals for treating water; and wastewater generation due to normal operation.

1. **Use of Fuel** - Boiler fuel often contains impurities which decrease boiler operation and efficiency. Fuels vary in British Thermal Units (BTU) content, costs, and the generation of waste. They also contain impurities from gas and solid combustion by-products. Incomplete combustion of the fuel and corrosion of the inside part of the boiler also produce solid wastes. Selection of fuel is dictated by availability and the overall cost per pound of steam which includes cost of fuel, storage, preparation, handling, and the total contribution of pollutants to the air around the facility.

One option for the facility is the use of chemical additives or cleaner fuels to reduce fouling. Natural gas is less likely to cause fouling, but availability or cost may limit its use. Because the EMS team does not find a substitute for its current fuel, the team will not suggest any objective or target, except continue to search for fuel substitution.

2. **Air Emissions** - The type of fuel the facility uses affects the air emissions from a boiler. If substitution of a cleaner fuel is not an option, options for emission reduction must be examined. Since pulverized coal fuels are used in the facility, nitrous oxides

(NO_x) and carbon monoxide (CO) can be reduced by exchanging the standard burner currently used by the facility for a low emission type burner.

Further reduction can be obtained with the addition of a flue gas recirculation system, or a steam injection system. In this case, the EMS team decides to implement both options, i.e. to replace the burner and to install a flue gas recirculation system. These are two objectives related to the air emission aspect. The respective targets are the reduction of NO_x and CO by 10 percent, and the reduction of NO_x and CO by 5 percent. Both targets are over baseline in a 12-month period.

3. **Use of chemicals for treating water** - Boiler feedwater often contains impurities which impair boiler operation and efficiency. Removal of deposits and corrosion products from the waterside of boiler tubes results in the generation of “boiler chemical cleaning wastes.” The composition of cleaning wastes depends on boiler feedwater constituents, boiler tube metallurgy, time between chemical cleaning tasks, task time, and type of cleaners used.

The EMS team decides that in order to improve boiler feed water, reverse osmosis equipment will be installed ahead of ion exchanges to reduce mineral loading and frequency of regeneration. This is the objective. The target is to reduce mineral loading by 20 percent.

For boiler cleaning, sodium polyacrylate injection may be used to remove deposits without having to shut down the boiler. For this option, the team is still indecisive until further evaluation is completed.

4. **Wastewater generation due to normal operation** - Wastewater is generated from various processes and even though some pretreatment is required, the EMS team decides to reuse wastewater for cooling-tower makeup as the objective. The benefit is conserving water by as much as 25 percent. The target is a 25 percent reduction compared to baseline in a 12-month period.

The process of developing objectives and targets for warehousing operation and maintenance is similar to the process used for the boiler. Although the process for warehousing and maintenance is not described in this module, the outcome is outlined in the following Table G. The table displays objectives and targets developed to address all nine significant aspects in the warehousing operation, maintenance, and boiler operations identified in our aspect analysis. The result in our exercise is seven identified objectives and targets. Three staff members are responsible for the implementation and completion of the objectives and targets. Baseline amounts must be established prior to launching the objectives as specific targets are based on reductions of those amounts over a 12-month period.

Table G – Objectives and Targets for the Nine Sample Aspects

Aspect No.	Aspect with Significant Impact	Objective	Target	Completion Schedule	Responsible Staff
1	Electricity Use	Replace lighting bulbs with high efficiency bulbs	Reduce energy use by 10 percent	March 2014	James Jones
2	Ventilation emissions	No Action	No Action	N/A	N/A
3	Generation of solid waste	Implement in-house recycling	Recycle 90 percent of solid waste generated	March 2014	James Jones
4	Use of paints and solvents	Substitute paints and solvents with water based materials	Reduce volatile organic compounds (VOCs) emission by 20 percent	March 2014	Cathy Atwell
5	UST leak potential	No Action	No Action	N/A	N/A
6	Use of fuel	No Action	No Action	N/A	N/A
7	Air emissions	Replace standard burner with low emission type burner	Reduce NO _x and CO by 10 percent	December 2014	Robert Black
		Install flue gas recirculation systems	Reduce NO _x and CO by 5 percent	March 2014	Robert Black
8	Use of chemicals for treating water	Install reverse osmosis equipment ahead of ion exchangers	Reduce mineral loading by 20 percent	September 2014	Robert Black
9	Wastewater generation due to normal operation	Build a pretreatment unit and reuse pretreated wastewater unit for cooling tower	Reduce water use by 25 percent	June 2014	Robert Black

The above table reveals two important facts in developing objectives and targets:

1. Not every aspect with significant impact is required under ISO-14000 to have an objective and target. It might be necessary to buy and install new equipment in order to develop an objective. If the current budget is not sufficient, the facility may choose to do nothing until the next fiscal year or, the new technology may require further research for applicability, i.e., in relation to product quality or return on investment.
2. An aspect may result in more than one objective based on what the facility feels is necessary to reduce an aspect's impact. As shown in #7 above, two different objectives and targets have been set under one aspect to achieve the desired results.

C. Summary of Developing Objectives and Goals

Objectives and targets should be developed to address significant impacts and must promote pollution prevention, environmental compliance, and continuous improvement. The EMS manager, with the assistance of the EMS team, should work on developing objectives and targets. Objectives and targets should be directly related to the activity, process, waste, products, or service that has a significant impact and must be approved by upper management

The aspects, rating criteria for significance, objectives and targets should be reviewed and updated annually. Updates will also be required for any addition or modification of an activity, process, product or service. Changes to the criteria for determining aspects and significant impacts must be recorded in the facility's aspect procedure.

D. Overview of Thought Process for Development of an EMS

This module presented examples to illustrate the thought process involved in developing an EMS. Table H represents the tabulation of this entire process using the same sample company processes – warehousing, maintenance and boiler – we have been discussing throughout this module. The table reflects the scope of a typical EMS plan and highlights the relationship between a facility's activities, processes, products, or services and related aspects and impacts. The cumulative impacts are indicated by the total score of impact, and the objectives and targets which are planned to be accomplished by the facility.

Table H – Tabulation of Entire Sample EMS Process

Activity, Process, Products, Service	Aspect	Depletion of Resources	Amount of Waste Generated	Regulated	Cost to Mitigate	Interested Parties	Frequency of Occurrence	Total Score	Objective	Target	Completion Schedule	Staff Lead	Goal No.
Warehousing	Electricity use	3	0	3	0	3	3	12	Replace light bulbs with high efficiency bulbs	Reduce energy use by 10 percent	03/05/12	Jim	1
	Ventilation emission	0	2	3	1	3	3	12					
	Wastewater Discharge	3	3	0	0	0	0	6					
	Chemical Spill Potential	1	2	3	2	0	1	9					
	Generation of Solid Waste	2	3	3	0	3	3	14	Implement in-house recycling	Recycle 90 percent of solid waste	03/05/12	Jim	2
Maintenance	Use of Paints and Solvents	3	1	3	0	3	3	13	Substitute current products with water based materials	Reduce VOCs by 20 percent	03/03/12	C.B.	3
	Use of Oils	2	1	0	0	0	3	6					
	Oil Spill Potential	1	2	3	2	0	1	9					
	UST Leak Potential	3	3	3	3	3	1	16					
	Vehicle Refueling Emission	0	0	0	0	3	3	6					
	Refueling Spill Potential	1	2	3	1	0	2	9					

Table H – (cont.)

Activity, Process, Products, Service	Aspect	Depletion of Resources	Amount of Waste Generated	Regulated	Cost to Mitigate	Interested Parties	Frequency of Occurrence	Total Score	Objective	Target	Completion Schedule	Staff Lead	Goal No.	
Boiler	Use of Fuel from AST	3	1	3	0	3	3	13						
	Fuel Oil Spill Potential	1	2	3	1	0	1	8						
	Air Emissions	0	2	3	1	3	3	12	Replace standard burner with low emission burner	Reduce NOs and CO by 10 percent	12/05/12	Bob	4	
	Use of Chemicals for Treating Water and Boiler Blowdown		3	3	3	0	3	3	15	Install flu gas recirculation system	Reduce NOs and CO by 5 percent	03/06/12	Bob	5
										Install reverse osmosis ahead of ion exchanges	Reduce mineral loading by 20 percent	09/05/12	Bob	6
	Chemical Spill Potential	1	2	3	3	0	1	10						
Wastewater Generation from Normal Operations	3	2	3	0	3	3	14	Install a pretreatment unit and reuse pretreated waste						

Module VIII

EMS Implementation

A. Introduction

In this module, the operations associated with significant environmental aspects and ways to control them from negatively impacting the environment will be described. Five factors that can be used to control environmental aspects will be discussed: operational controls, employee training, communication, emergency preparedness and response, and records and record keeping.

1. **Operational Controls**, also known as operating procedures or work instructions, represent mechanisms used by a facility to control its environmental aspects. Operational controls are basically necessary for any operation which is regulated.
2. **Employee Training** for those whose jobs or activities can impact the environment is critical for successful implementation of an EMS. The EMS team should develop and maintain procedures to identify and track environmental training needs of those employees, and implement an employee training program. This program may need to be revised as operational results are documented and new training needs are identified.
3. **Communication** is also vital for successful implementation of an EMS. The EMS team should establish and maintain procedures for internal communication of the EMS between all employees. Similarly, procedures for external communication with the public, including local community and environmental interest groups, should be developed.
4. **An Emergency Preparedness and Response plan has typically already been** developed for most facilities. This usually addresses some type of emergency, spill or fire, and procedures for meeting Occupational Health and Safety (OSHA), Environmental Protection Agency (EPA), and local fire department requirements. The EMS team should ensure that an appropriate emergency response plan is established and maintained to adequately prepare, respond, and mitigate accidents, spills, fires, or other emergency situations and is part of the overall EMS.
5. **Records and Record Keeping** is the final factor of EMS implementation. The EMS team should establish documentation and record keeping procedures to ensure that the EMS program is functioning effectively and efficiently.

In the following sections, a detailed discussion on each of these five factors is provided. Each of these EMS implementation factors has the same level of importance so the EMS team can decide the order of implementation. Operational controls are usually addressed first, however.

B. Developing Operating Procedures and Work Instructions

Operating procedures and work instructions function as a mechanism to control a facility's environmental aspects. Therefore, they are also called "operational controls." There should be an operating procedure or work instruction for any process in the facility, which, if uncontrolled, would have a detrimental effect on the environment.

Procedures and work instructions are used interchangeably in this context. However, procedures are typically more general, applicable to a larger audience, and usually at a higher level in the document hierarchy. Work instructions are applicable to a specific task or process.

There are three things to remember when developing operating procedures and work instructions: (1) the EMS team must ensure they conform to the EMS requirements including compliance with environmental regulations and permit conditions; (2) operating procedures and work instructions should be written by the department that oversees the operation; and (3) employees who are going to be involved in the activities or processes should be trained on the procedure or work instruction.

The EMS manager will perform the final review of the facility's operating procedures while the departmental management will sign the final document. Work instructions should be signed by each department's supervisor and acknowledged by employees who will implement the procedure.

1. Which Aspects Need Operational Control

Because an operational control is required for any operation which is regulated, or any process in the facility which would have a detrimental effect on the environment if the process is not sufficiently controlled, the first step in developing an operational control is to determine which aspects of a process (or operation) need an operational control.

Operations which are regulated or have aspects resulting in significant impacts for our sample facility were first discussed in Module V, Table D, page 22 (warehousing, maintenance, and boiler). The following table summarizes those three operations which altogether have 17 aspects.

Of the listed 17 aspects, 14 are required to have operational controls because: (1) they are regulated (a "yes" in column 4); (2) they have significant impacts (a "yes" in column 3); or (3) both reasons. Columns 3 and 4 in the table show that aspects 3, 7 and 10 do not require operational controls.

Table I – Aspects Needing Operational Controls

Activity, Process, Product, Service	Aspect	Significant Impact	Regulated	Current Procedure	EMS Procedure	Responsible Department
Warehousing	1. Electricity use	Yes	Yes	None	5	Operations
	2. Ventilation emissions	Yes	Yes	Preventive maintenance	1	Operations
	3. Wastewater discharge	-	-	Preventive maintenance, employee training	4	Operations
	4. Chemical spill potential due to unloading and transfer operation	-	Yes	Storm water Pollution Prevention (P2) plan, Spill Prevention Control and Countermeasures (SPCC)	7	Operations & Admin.
	5. Generation of solid waste	Yes	Yes	Safety Data Sheets (SDS), manifests	3	Admin.
Maintenance	6. Use of paints and solvents	Yes	Yes	SDSs	6	Operations
	7. Use of oils	-	-	SDSs	6	Operations
	8. Oil spill potential	-	Yes	Storm water P2 plan, SPCC, preventive maintenance of tanks, SDS, manifests, employee training	7	Operations & Admin.
	9. UST leak potential	Yes	Yes	Preventive maintenance of leak detection system	7	Operations
	10. Vehicle refueling emissions	-	-	Preventive maintenance	1	Operations
	11. Refueling spill potential	-	Yes	Storm water P2 plan, SPCC, preventive maintenance of tanks, SDS, manifests, employee training	7	Operations & Admin.
Boiler	12. Use of fuel	Yes	Yes	SDSs	6	Operations
	13. Fuel oil spill potential	-	Yes	Storm water P2 plan, SPCC, preventive maintenance of tanks, SDS, manifests, employee training	7	Operations & Admin.
	14. Air emissions from stacks	Yes	Yes	Preventive maintenance, stack test, start-up and shut down, employee training	2	Operations
	15. Use of chemicals for treating water, boiler blow down	Yes	Yes	SDSs	6	Operations
	16. Chemical spill potential	-	Yes	Storm water P2 plan, SPCC, preventive maintenance of tanks. SDS, manifests, employee training	7	Operations & Admin.
	17. Wastewater generation due to normal operation	Yes	Yes	Preventive maintenance, employee training	4	Operations

Of those aspects requiring operation controls, some aspects can be grouped based on their similarity of impact to the environment. EMS procedures or work instructions are then developed for these groups of aspects.

For the sample facility, ventilation emissions and vehicle refueling emissions, for example, can be grouped together under the label of fugitive air emissions. Use of oils, fuel, paints and solvents are combined under the heading of use of chemicals. Similarly, chemical spill, oil spill, refueling spill, and underground storage tank spill potentials can be grouped as spill management. This pattern of grouping results in the following

- | | |
|-------------------------|-----------------------|
| *Fugitive Air Emissions | *Stack Air Emissions |
| *Solid Waste Management | *Wastewater Discharge |
| *Electricity Use | *Chemical Use |
| *Spill Management | |

The above example shows that seven EMS operational controls are required for the warehousing, maintenance, and boiler operations. Column 6 in Table I displays those seven operational controls with their respective aspects of the three operations.

Column 5 in the table identifies the operational controls which are currently available. The operational controls may include any operating procedures, work instructions, preventive maintenance plans, monitoring plans, regulatory compliance, or product quality documents. Many of these operational controls may have been identified when the facility was developing its EMS (see Module II).

Column 7 shows the responsible department in charge of the operation and the implementation of the operational controls.

2. **Protocol for Writing Operating Procedures and Work Instructions.**

The next step is for the EMS team to develop a protocol for writing the general EMS operational controls so the responsible departments can write their own operating procedures. The protocol contains rules which describe the content and requirements of operating procedures or work instructions for any operation which if uncontrolled, would have a detrimental effect on the environment.

Operational controls, however, can also have other important functions. Some of these include:

- *Communication tools – they make the user aware of the facility’s EMS and what environmental aspect is being controlled via the procedure or instruction;
- *Training Need Assessment – they help identify if the user is trained and competent in procedure or instruction;

*Monitoring and Measurement Checks – if the procedure or instruction requires measurement via the use of equipment (e.g. pH meters, magnetic gauges, etc.), these pieces of equipment should be calibrated on a regular basis to ensure accuracy;

*Document Quality Control – they must be current, legible, and available at the point of use.

A sample of a simple protocol for writing operating procedures is provided below. Each section describes the type of information that is to be written into the department operating procedures and work instructions.

Procedure No: EMS-2
Issue Date: January 1, 2013
Revision No: Original (1, 2, 3 as changes are made)
Title: Writing Operating Procedures and Work Instructions
Approved By: John Doe (name of final approver)

1. Purpose

This protocol is developed to describe the content of operating procedures and work instructions for activities and processes of XYZ Facility, which, if uncontrolled, would have a detrimental effect on the environment.

2. Scope

2.1. All operating procedures and work instructions shall mention the activities and processes being monitored.

2.2. A corrective provision shall be provided in the procedure in the event that operating parameters are exceeded.

3. Definitions

3.1 *Monitoring:* measurement checks or samples collected as specified in the monitoring and sampling plan.

3.2 *Operating Parameter:* specific conditions required in an operation. Examples: temperature or pH requirements, air flow, magnetic gauge settings.

4. Procedures

4.1. Any description of an activity performed to prevent a negative environmental impact.

4.2. Operating parameter, if applicable, must be incorporated into the procedure or work instruction.

4.3. If operating parameters are exceeded, or if the procedure is not followed due to a justified reason, an emergency response provision must be provided so the user knows what to do to correct the deviation. Also discusses the consequences of not following the proper procedures.

4.4. Any operating procedure that requires measurement via the use of monitoring equipment must have a separate monitoring and measurement procedure which specifies frequency of calibration of monitoring equipment to ensure measurement accuracy.

5. Updates and Reviews

Operating procedures and work instructions must be reviewed annually or when the activity changes. The current procedure should always be available at the workplace.

6. Responsibilities

6.1. The supervisor responsible for an activity or process will develop and implement the operating procedure or work instruction for activities under his supervision.

6.2. Approval of the operating procedure is typically the responsibility of the department or section manager.

6.3. The procedure is written for the person following it (line operator).

7. Documentation

7.1 All operating procedures and work instructions will be maintained in hard copy or electronically by the EMS manager in addition to the operational department.

7.2. Response actions to correct deviations from operating procedures or work instruction will be maintained.

7.3 Records generated in the course of following the procedure (pH measurements, recording of temperature, gauge readings) must be maintained.

7.4 The EMS manager must ensure that all procedures or work instructions are current, legible, and located at the point of use.

End of Procedure EMS-2

B. Employee Training

Employee training is vital for a successful EMS. Communication and education, or training, can be designed by the facility to motivate employee participation, build upon existing skills, and provide new learning opportunities. Various types of training can be implemented including:

1. **EMS Awareness Training** – this emphasizes the importance of the employees’ role in the EMS program. After this training, all employees will be able to answer the following questions:

- *What is an EMS?
- *Why is our facility adopting an EMS?
- *How can I contribute to the success of the EMS program?”

2. **Job Related Training** – this training is required for all employees with responsibility or authority over activities that have significant environmental impacts. The facility needs to identify environmental training needs for employees related to job function; track the implementation of the job related training; and review, update and repeat the training as necessary.

Job-related training is critical because EMS procedures and work instructions developed for processes and operations of significant impact may change the existing work practices or responsibilities of an employee. To anticipate these changes, the affected employee must be prepared by completing job-related training. Job related training should be conducted by someone knowledgeable about the operation. The supervisor, who directly supervises the operation, is typically the trainer.

After job-related training, the affected employee should be able to answer the following questions:

- *What changes are being made to the procedures or work instructions?
- *Why are the changes necessary?
- *What changes will affect my daily activities?

Some procedural changes can be very simple. For example, an employee who usually checks the reading of equipment to ensure that the equipment runs per equipment instructions, could now be required to document readings in a log book because of the newly developed EMS operational procedures.

In addition, because environmental awareness should be the concern of all employees, job related training should also address pollution prevention and environmental compliance issues. In this regard:

- *Job related training should encourage employees to look for opportunities to conserve water, energy, and natural resources and to prevent pollution.

*Although compliance issues may not be directly related to the employees' work, everyone must be aware of the potential environmental impact of their activities.

3. **Environmental, Health, and Safety (EHS) Training** – this is essential to maintain an effective EMS. This type of training addresses one type of training required by law and must be conducted by certified trainers.

EHS training may include the following:

- * Hazard communication regulated by OSHA
- * Fire response regulated by OSHA
- * Health and safety issues: confined space, personal protective equipment (PPE), etc.
- * Storm water pollution prevention plan (SWPPP)
- * Spill prevention control and countermeasure (SPCC)
- * Hazardous waste management regulated by the Resource Conservation and Recovery Act (RCRA)

A program for each training--EMS awareness training, job-related training, or EHS training--must be developed. The training program should include identifying all types of training in the facility and tracking the training implementation. The responsibility of identifying and tracking employee training can be assigned to a single department, or if preferable, the responsibility for tracking can be shared by multiple departments. Some facilities designate their Human Resources departments to handle all aspects of employee training while others assign their EHS divisions. Or, some facilities perform the training within a specialized department but have Human Resources be responsible for tracking the training.

The format or duration of training varies by the various types needed. Choose the appropriate training mode so that it can be conducted without disrupting facility operations any more than necessary. Employee training can take the form of an all-day workshop, a 15-minute presentation at lunch, or an agenda item for discussion at weekly EHS meetings. The facility may also use computer-based webcams and videos that employees can watch at their convenience.

The need for employee training can change due to changes in training requirements. Therefore, it is imperative that a facility has a system in place that can be used to review training requirements. One type of system includes making a list of: the different types of training conducted by the facility, the frequency of training, the designated trainers for each type of training, and the groups of employees who will be included in each type of training.

An example of our sample facility's training identification is provided in the following table. It shows that a total of 10 types of training are identified for our facility.

Table J – Identification of Training Programs

No	Training Type	Required by	Frequency	Trainee	Trainer
1	EMS Awareness	EMS	Annual	All employees	EMS Manager
2	Operational Controls	EMS	Annual	Warehousing, boiler, and maintenance employees	Immediate Supervisor
3	Hazard Communication	OSHA	Annual	Warehousing, boiler, and maintenance employees	Operations Supervisor
4	Fire Response	OSHA	Annual	Warehousing, boiler, and maintenance employees	Operations Supervisor
5	Boiler Operation	Air Quality Permit	Annual	Boiler employees	Operation Supervisor
6	Storm Water Pollution Plan	SWPP	Annual	All employees	Storm Water Operator
7	Spill Prevention Control and Countermeasure	SPCC	Annual	All employees	Emergency Response Coordinator
8	Hazardous Waste Management	RCRA	Annual	Warehousing, boiler, and maintenance employees	Operations Supervisor
9	Worker Health and Safety	OSHA	Annual	Warehousing, boiler, and maintenance employees	Operations Supervisor
10	New Employee Orientation	Facility	Per Policy	All new employees	Human Resources

A system to track training can be organized by training type or by employee name. Documentation of training that will satisfy EMS requirements should include some type of standardized tracking forms. This documentation is necessary to demonstrate that all employees receive adequate training to perform their duties effectively and that the training program is functioning efficiently.

The training program is particularly important as new employees join the organization. It will not only ensure that new employees are aware of the commitment that the company has made to its EMS program, but will also ensure that the employee is fully aware that he or she will be an integral part of its success.

To maintain continuity and consistency of a facility’s training program, an EMS protocol for employee training must be developed. A sample EMS protocol for employee training is provided below.

Procedure No: EMS-3
Issue Date: January 1, 2013
Revision No: Original (1, 2, 3 as changes are made)
Title: Employee Training and Tracking
Approved By: John Doe (name of final approver)

1. Purpose

The purpose of this procedure is to implement employee training at XYZ facility to ensure that all employees receive adequate training to perform their duties effectively in a safe and environmentally sound manner.

2. Scope

This procedure contains employee training requirements for the EMS and facility operations consisting of EMS awareness training, job-related training, and environmental, health, and safety (EHS) training.

3. Procedures

3.1. The EMS manager will identify training needs of all employees with the assistance of the EHS manager, operations managers and human resources. The result of training needs identification is a list of employee training needs which contains the training types, the names of employees requiring training, the frequency of training, and the trainer for each type of training.

3.2. The EMS manager will assign a representative. This training coordinator is responsible for all aspects of employee training and is typically someone within the HR department.

3.3. The training coordinator will utilize this list to develop a series of training modules. Each module describes the content (scope and depth) of training, the format and duration of training (e.g. a half-day workshop, a 30-minute video), and who the trainer will be (a designated in-house trainer or a certified external trainer who has expertise appropriate to the training to be delivered).

3.4. Depending on how the training is administered, the training coordinator will track employee training by using a sign-in sheet, a log form, or a computer-based completion sheet, for each of the training classes.

4. Update and Reviews

Training and tracking must be reviewed annually or when environmental or legal requirements change. EMS training should be provided to new employees as soon as possible after joining the organization and a refresher course should be provided to all employees at least every other year at a minimum, but preferably on an annual basis.

5. Responsibilities

The HR department is responsible for training records. Any updates or changes to environmental training protocol must be approved by the EMS and operations managers.

6. Documentation

Employee training and tracking protocol, list of employee training needs, and employee training records will be maintained in hard copy or electronically by the HR department or EMS manager.

End of Procedure EMS-3

C. Communication

Communication can be defined as a tool for transmitting information among and between groups of people. Effective communication must satisfy the following requirements:

1. The message must reach the intended audience.
2. The audience must understand the content of the message.
3. The audience must be able to respond to the message.

The first and second requirements state that the message must reach the intended audience and the intended audience must understand the purpose of the message. This means that the communication plan must specify the intended audience, the content of the message that will be communicated, and how the message can reach the intended audience effectively.

The third requirement states that the audience must be able to respond to the message. This means that an internal communication plan should provide an atmosphere where employees can transmit both good and bad information without fear of reprisal. This might include the use of “suggestion boxes” or other methods that would give the employee anonymity if they so choose.

Two of the most critical components of an EMS are management commitment and employee participation. Training, discussed in the previous sections, is one of the tools for employee participation. The other tool is internal communication. This internal communication must be designed to facilitate employee participation.

EMS also requires facilities to strengthen external communication on environmental issues to the local community, environmental groups, government agencies, and the public. Obtaining public understanding on these issues is vital to sustain an EMS program.

The EMS manager is responsible for coordinating both the internal and external programs. For external communication plans, this may include intermittent surveys, a response or question portion on the facility web pages, or a listing of employees who may be contacted for specific topics.

Modern communication techniques and the widespread use of e-mail, instant messages and online social media sites for example, makes communication faster than many other conventional

communication media. However, other standard communication media to consider include traditional employee bulletin boards, internal and external facility newsletters, intranets and public and in-house group meetings.

1. Internal Communications

In order to develop a communication plan for a facility, the internal communication mechanisms currently practiced at the facility must be identified and compared with what is required for EMS communication. Once the comparison is complete, a communication plan can be developed utilizing applicable communication techniques. Items that should be communicated in the internal communication program include the status of environmental compliance, EMS objectives and targets, and the environmental policy.

Typically, a communication plan involves identifying what techniques are used for communication (interoffice memorandum, e-mail, facility newsletter, intranet posting, posted notices on bulletin board, suggestion boxes) and what information is relevant to the audience. A simple communication plan is shown below:

Table K – Internal Communication Plan

Communication Technique and Type of Information	Origin of Information	Target Audience
Interoffice memorandum and/or e-mail: <ul style="list-style-type: none"> - notice of audit - equipment shutdown schedule - accidental spill - equipment malfunction - emission exceedance - notice of violation - citizen complaint - progress report on objectives and targets - update on measurement results 	EMS Manager Operations Supervisors	Warehousing Employees Boiler operations Employees Maintenance Employees
Facility newsletter <ul style="list-style-type: none"> - EMS program update - etc. 	EMS Manager Human Resources	All Employees
Bulletin board/intranet <ul style="list-style-type: none"> - notice of EMS award - notice of deadlines - etc. 	EMS Manager Operations Supervisors	All Employees
Employee suggestion box	All Employees	EMS Manager Supervisors Human Resources

The EMS manager is the person responsible for overseeing EMS communication and developing a protocol for internal communication. The protocol outlines the types of communication, when the protocol must be updated and the responsibility associated with developing and updating the protocol.

A simple protocol for EMS internal communication is provided below.

Procedure No: EMS-4
Issue Date: January 1, 2013
Revision No: Original (1, 2, 3 as changes are made)
Title: Internal Communication
Approved By: John Doe (name of final approver)

1. Purpose

The purpose of this procedure is to establish and maintain an internal communication system for the **XYZ facility**.

2. Scope

This procedure contains the types of information required to be communicated internally for sustaining the EMS and the communication techniques used for transmitting information to the appropriate audience.

3. Procedures

3.1 The EMS manager will identify the type of information to be communicated for facility operations, EMS implementation, environmental compliance, and employee participation. The information includes EMS updates on objectives and targets, schedules of environmental audits, notices of violation, citizen complaints, accidental spills, emission issues, and any other topics related to environmental management.

3.2 The EMS manager will list the communication techniques associated with each type of information identified in 3.1. The techniques include interoffice memorandum, e-mail, facility newsletter, bulletin board, employee suggestion box, and group meetings.

3.3 The EMS manager will develop a plan that covers communication techniques and related information to be transmitted, the origin or initiator of the information, and the intended audience.

4. Updates and Reviews

The internal communication plan will be reviewed annually and revised as necessary.

5. Responsibilities

The EMS manager is responsible for updating the internal communication plan and revising the protocol when needed.

6. Documentation

The internal communication plan and protocol will be maintained by the EMS manager in hard copy or electronically.

End of Procedure EMS-4

2. External Communications

An effective external communication system must facilitate and encourage public understanding and dialogue on environmental issues and public concerns. External communication can take many forms that may include:

1. Neighborhood hotline for questions or complaints regarding your facility.
2. Press releases and website updates on environmental activities.
3. Open house for the community and the employees' families.
4. Facility tours for the public.
5. Sponsorship of community events.
6. Participation in local actions targeting the environment.
7. Presentations in workshops, conferences, and schools.
8. Membership and involvement in industry associations and chamber of commerce.
9. Correspondence with regulating agencies.
10. Updates to the facility's website or social media outlets.

From the type of communication listed above you may use those types or techniques which are most appropriate for your external communication needs. Similar to an internal communication plan, an external communication plan involves identifying what techniques are used for external communication, what kind of information is transmitted, the source or origin of the information, and the destination or the intended audience. An external communication plan can be as simple as the following example:

Table L – External Communication Plan

Communication Technique and Type of Information	Origin of Information	Target Audience
Neighborhood hot line - questions - complaints: noise, odor, etc.	General public	EMS Manager Human Resources
Press release - environmental activities	EMS Manager	General public
Open house - facility's programs	EMS Manager Human Resources	General public
Facility tours - facility operations	EMS Manager Human Resources Operations Supervisors	General public
Sponsorship - community events	EMS Manager Human Resources	Local community
Participation - local actions on environment	EMS Manager Human Resources	Local community
Presentation - facility programs	EMS Manager	General public
Membership and involvement - trade associations	EMS Manager	Industrial community
Correspondence - permit - spill/release reporting - compliance issues, etc.	EMS Manager	Regulating agencies

The EMS manager should be the contact person for handling external communication to ensure consistency for responses coming from the facility. Having a single contact person also facilitates smoother communications between the facility and the regulating agencies because the agencies know whom to contact in case of emergency or when they need quick answers to questions.

Similar to the case of internal communication, a protocol for external communication must also be developed. The external communication protocol describes the types of external communication, when the protocol must be updated, and the responsibility associated with developing and updating the protocol.

A sample protocol for EMS external communication is provided on the following page.

Procedure No: EMS-5
Issue Date: January 1, 2013
Revision No: Original (1, 2, 3 as changes are made)
Title: External Communication
Approved By: John Doe (name of final approver)

1. Purpose

The purpose of this procedure is to establish and maintain an external communication system for the XYZ facility.

2. Scope

This procedure contains the types of information required to be communicated externally for sustaining the EMS and the communication techniques used for transmitting information to the appropriate audience.

3. Procedures

3.1 The EMS manager will identify the type of information for effective external communication that encourages public understanding and dialogue on environmental issues and public concerns. The type of information includes the facility's programs, operations, activities, and any other events related to environmental management as well as community and public concerns.

3.2 The EMS manager will list the external communication techniques associated with each type of information identified in 3.1. The techniques include hotline, press release, open house, facility tour, sponsorship, event participation, conference presentation, association membership and involvement, and correspondence.

3.3 The EMS manager will develop an external communication plan which covers communication techniques and related information to be transmitted, the origin or initiator of information, and the intended audience.

4. Updates and Reviews

The external communication plan will be reviewed annually and revised as necessary.

5. Responsibilities

The EMS manager is responsible for updating the internal communication plan and revising the protocol when needed.

6. Documentation

The internal communication plan and protocol will be maintained by the EMS manager in hard copy or electronically.

End of Procedure EMS-5

E. Emergency Preparedness and Response

An EMS requires that a facility establish and maintain procedures to respond to and report accidents, spills, process upsets, malfunctions, and other emergency situations, and to mitigate associated environmental impacts. The EMS facility is also required to examine the procedures after the occurrence of an emergency.

An emergency can be defined as the conversion of the source of danger into an actual occurrence of loss, injury, or some form of damage that calls for immediate action.

The definition implies that the first step in developing an emergency plan is to identify the sources of danger in a facility. This will include identifying areas, equipment, or processes that would require an emergency response in the event any of those sources of danger triggers. Here are examples of things to look for.

1. Storage tanks (above and below underground)
2. Storage areas where hazardous materials/wastes are stored
3. Loading and unloading areas
4. Truck routes within the facility
5. Process equipment involving hazardous materials
6. Pollution control equipment
7. Situations that can create spark or fire
8. Facility owned or managed hazardous material in transportation or use offsite

In order to meet EPA, OSHA, and Department of Transportation (DOT) requirements, most facilities have some form of emergency preparedness and response system in place in the event of an emergency, spill or fire.

In order to establish an EMS emergency plan, it is necessary to identify current emergency response plans and procedures. These plans may include a Hazardous Waste Contingency Plan, Spill Prevention Control and Countermeasures Plan, Storm Water Pollution Prevention Plan, Air Quality Permit Excess Emissions Report, Fire Evacuation Plan, Hazardous Material Management Plan or other emergency plan required by your local fire department. Based on a review of these plans and procedures, available equipment and emergency resources can be identified. Here are examples of equipment and emergency resources.

1. Emergency response equipment (fire extinguishers, spill kits, oil absorbent, eye wash stations, personal protective equipment, first aid kits, etc.)
2. Fire safety equipment (water hoses, sprinklers, smoke alarms, etc.)
3. Communication equipment (telephone, two-way radio, etc.)
4. Maps (facility layout, process flow, etc.)
5. Emergency resources (Material Safety Data Sheet, etc.)
6. External emergency responders (fire departments, police/hazardous materials teams, contractors, hospitals, etc.)
7. Regulating agency for emergency notification (EPA, state, county, city, etc.)

A simple table summarizing the scope of each plan and its respective emergency coordinate can be developed from existing emergency response plans. A sample summary table is provided below.

Table M – Emergency Response Plans

Existing Emergency Plan	Scope of Plan	Emergency Coordinator
Hazardous Waste Contingency Plan	Hazardous waste emergency, coordinator, equipment, emergency response.	Operations Supervisor
Spill Prevention Control and Countermeasures Plan	Oil spills, emergency equipment, response.	Central emergency response
Storm Water Pollution Prevention Plan	Contamination of storm water within the facility due to facility operations.	Storm water program coordinator
Air Quality Excess Emissions Report	Emergencies due to boiler operations	Operations supervisor
Emergency and Fire Evacuation Plan	Spills, fire, explosion, and any other type of emergencies, emergency equipment, alarm system, contact with outside emergency responders, emergency response, evacuation process.	Human Resources

The EMS manager (or EHS manager) is responsible for establishing and maintaining the facility’s emergency preparedness and response procedure. This person must ensure that the existing emergency plans and procedures are adequate for potential emergencies that can occur at the facility.

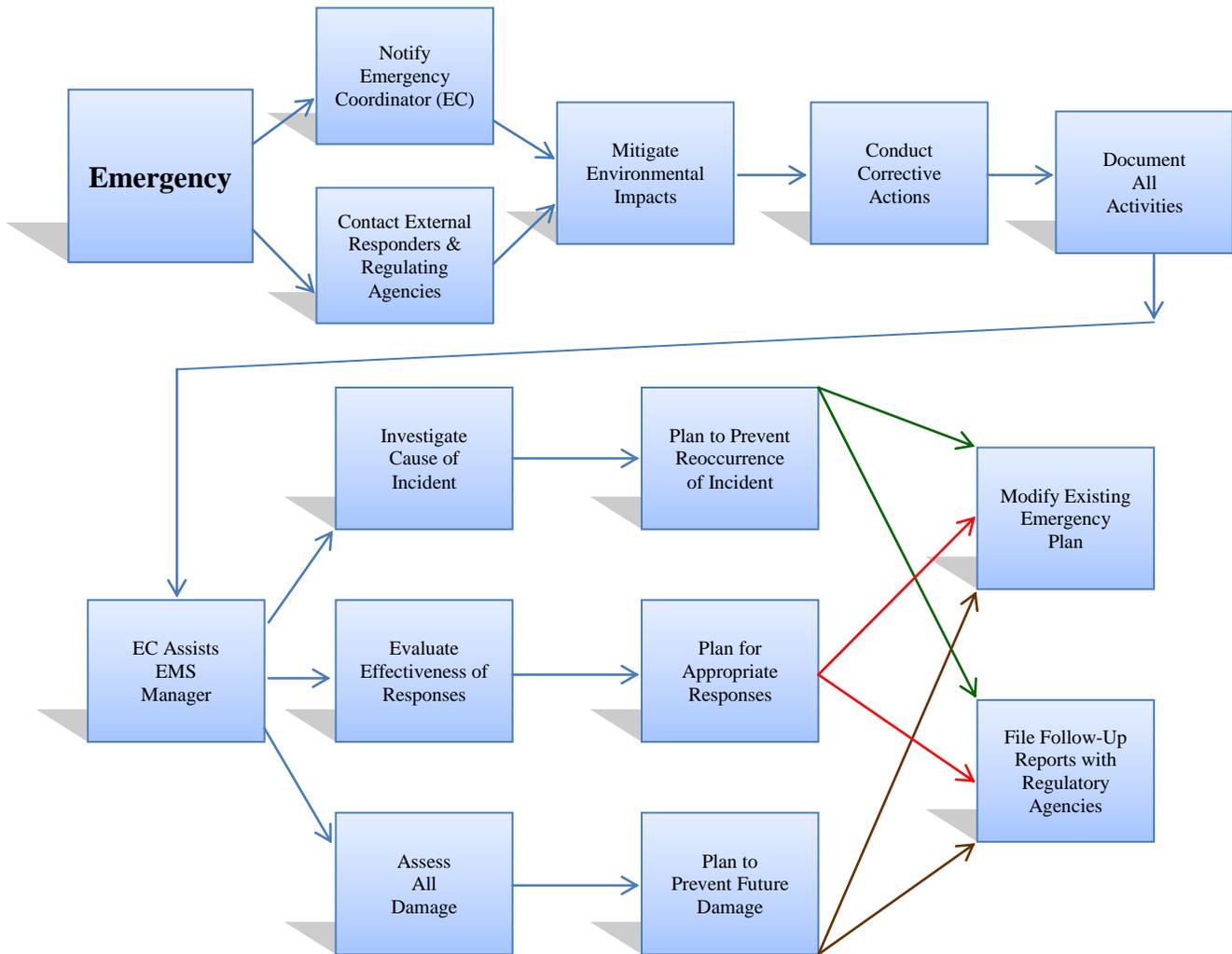
An emergency plan must contain provisions for the following areas:

1. **Emergency training** - this is an integral part of the employee training program
2. **Emergency drills** - conducted on an annual basis or as required by regulation
3. **Coordination with others** - this is conducted by a single contact person; the emergency coordinator whose task is to coordinate all emergency response measures

Designated by the EMS manager, the emergency cCoordinator is also responsible for emergency reporting required by regulatory agencies and the EMS.

An emergency plan must also contain a response procedure in the event of an emergency. Flowcharts are useful tools for showing the emergency response process. An example is provided below.

Table N – Emergency Response Flowchart



To maintain continuity and consistency of a facility’s emergency preparedness and response plan, EMS protocol for emergency planning must be developed. A sample of the protocol is provided on the following page.

Procedure No: EMS-6
Issue Date: January 1, 2013
Revision No: Original (1, 2, 3 as changes are made)
Title: Emergency Preparedness and Response System
Approved By: John Doe (name of final approver)

1. Purpose

The purpose of this procedure is to establish and maintain an emergency preparedness and response system for the XYZ Facility.

2. Scope

This procedure identifies the emergency preparedness and response plans for facility operations, the types of required emergency equipment, and procedures for training, response actions and reporting.

3. Procedure

3.1. The EMS manager will identify potential adverse environmental impacts that could arise from an emergency situation.

3.2. The EMS manager will identify and make a list of existing emergency preparedness and response plans for all operations. These plans include:

- a. RCRA emergency response plan
- b. SPCC and other spill plans
- c. SWPPP
- d. Air quality excess emissions report
- e. General emergency plan, fire evacuation plan

3.3. The EMS manager will identify and make a list of existing emergency response equipment. The list specifies the location and condition or expiration date of each piece of equipment. The types of equipment include:

- a. Fire extinguishers and sprinkler systems
- b. Fire and emergency alarms
- c. Spill kits, absorbents, mops, brooms, buckets, shovels, etc.
- d. Personnel protective equipment
- e. First aid kits, eye wash stations
- f. Other response equipment

3.4. The EMS manager will evaluate and ensure that current emergency preparedness and response plans, including emergency equipment, are adequate to respond to emergencies. Upon review, the EMS manager may revise the plans with the

assistance of the emergency coordinator. The emergency coordinator is appointed by the EMS manager.

3.5. In case of spill, fire, accident, or emergency, emergency response must be activated. The attached “Emergency Response Flowchart – XYZ Facility” outlines the procedure. It is the responsibility of the emergency coordinator to coordinate all emergency response measures. This includes contacting regulating agencies and external responders. He must provide reports required by the regulating agencies and ensure that the external responders are informed of potential hazards at the facility.

3.6. The EMS manager will ensure that evacuation maps and emergency phone numbers are posted in designated locations.

3.7. The EMS manager will ensure that emergency personnel have adequate training for any emergency.

3.8. The EMS manager and the emergency coordinator will conduct an emergency drill annually or as required by regulation.

4. Updates and Reviews

4.1. The emergency preparedness and response plans will be reviewed annually and updated as necessary to accommodate changes in processes or legal requirements.

4.2. Each emergency is to be reviewed for appropriate response and for prevention of reoccurrence immediately after emergency. Upon review, inadequate plans are to be revised.

5. Responsibilities

The EMS manager and the emergency coordinator are responsible for updating the emergency preparedness and response plans.

6. Documentation

Both the emergency preparedness and emergency response plans will be maintained in hard copy or electronically by the EMS manager.

End of Procedure EMS-6

Module IX

Record Keeping and Records

A. Purpose of System

A record keeping system must be established to record the extent to which planned EMS objectives and targets have been achieved. The purpose of record keeping is to identify all records pertinent to the implementation and operation of the EMS, including data which supports objectives and targets. It is important to protect confidential business information when making records available for public review. An initial review of existing materials for confidentiality should be completed and a determination of what is to be considered confidential as new documents are created should be established.

B. Type of System

An EMS record keeping system should be able to identify, locate and retrieve records quickly when needed. Some facilities keep electronic copies of all their records while others keep hard copies in a central location. The retention schedule may vary for each record and may be different based on the type of facility. In many cases, retention time requirements correspond with particular legal requirements. Many companies, however, consider these vital records and are kept for the life of the facility.

A computerized database tailored specifically for a company may have a high initial cost (the capital cost) but a low operational cost that results in time and cost savings over the life cycle of the database. Many companies use a simpler system and maintain a matrix (such as an Excel spreadsheet or an Access database) of their records that includes their retention periods. Items to include for easy retrieval of individual records might include, but are not limited to:

1. Indexing number assigned to document
2. Name of document
3. Type of document (operational, legal, etc.)
4. Name of process that document relates to
5. Whether document is available to public or confidential
6. Who is responsible for updating
7. Retention period

C. Types of Records

Environmental records may include the following:

1. Information on applicable environmental laws or other requirements.
2. Complaint records
3. Incident reports

4. Information on emergency preparedness and response
5. Information on significant environmental aspects
6. Employee training records
7. Process information
8. Equipment inspection, maintenance, and calibration records
9. Product information
10. Pertinent contractor and supplier information
11. Audit results
12. Management reviews
13. Copies of all numbered pProcedures developed during and after EMS implementation

Some or all of these documents may also be kept in other departments (such as employee training records may be contained within their personnel file), but copies should also be maintained in the EMS record keeping system.

The following sample protocol for EMS record keeping is provided to illustrate the control of facility records which incorporates the above requirements.

Procedure No: EMS-7
Issue Date: January 1, 2013
Revision No: Original (1, 2, 3 as changes are made)
Title: Record Keeping and Records
Approved By: John Doe (name of final approver)

1. Purpose

The purpose of this procedure is to establish a record keeping system and maintain records for the XYZ facility.

2. Scope

This procedure contains requirements for keeping, indexing, storing, updating, and maintaining records for the EMS.

3. Procedures

3.1. Records to be kept for the EMS Program include:

- a. Applicable environmental laws, permits, and other requirements
- b. Complaint records
- c. Information on emergency preparedness and response
- d. Incident reports
- e. Information on significant environmental aspects
- f. Employee training records

- g. Process information
- h. Equipment inspection, maintenance, and calibration records
- i. Product information
- j. Pertinent contractor and supplier information
- k. Audit results
- l. Management reviews
- m. Copies of all numbered procedures developed during and after EMS implementation

3.2 Records will be indexed using a specific numeric system designed by the EMS team.

3.3 An initial review of existing materials for confidentiality will be completed prior to indexing by the EMS team.

3.4 A decision of what is to be considered confidential as new documents are created will be completed by the EMS manager and indexed accordingly.

3.5 Documents developed for the EMS program will be retained for the life of the facility. Legal records are to be maintained at least to the minimum retention time as required by law.

3.5 Obsolete and outdated records are to be removed.

4. Updates and Reviews

The list of records will be updated as necessary. This records and record keeping procedure will be reviewed annually and updated as necessary.

5. Responsibilities

5.1. Each department is responsible to initiate changes in record keeping if deemed necessary.

5.2. The EMS manager is responsible for updating the list of records, and the records and record keeping procedure.

6. Documentation

The list of records and the procedure for records and record keeping will be maintained in hard copy or electronically by the EMS manager.

End of Procedure EMS-7

Module X

EMS Feedback

A. Introduction

EMS can be visualized in terms of “input ⇒ process ⇒ output ⇒ back to input.” Feedback is defined as a flow of information from the “output” (or end) of a system back to its “input” (beginning) of the system. The flow is used to transmit information about the “process” within the system. Essentially, EMS feedback represents a mechanism for conveying information about how a facility is implementing its EMS. It provides the facility management with information on the facility’s conformity status with the EMS requirements and indicates discrepancies, exceptions or nonconformity issues. The feedback also provides the facility with information on areas that have shown improvement. An audit is an essential mechanism for conducting EMS feedback.

B. Audit Program

An audit is a systematic and documented process for obtaining evidence. Many large facilities have specific programs for conducting an audit on their business operations. These audit programs include activities necessary for planning and organizing audits, resources needed to conduct audits and frequency and types of audits (e.g. quality audit, environmental audit, compliance audit, or joint audit). EMS audits for large facilities are usually covered within their overall audit programs. Unlike large facilities, small- or medium-sized facilities may not have formal audit program. A small business enterprise may simply rely on an EMS audit plan for its audit.

The term “systematic” in the definition of audit implies that the audit process is conducted based on an audit plan. The EMS audit plan specifies the scope and extent of an EMS audit. The audit scope defines the physical locations, organizational units, activities and processes and the time period covered by the audit. EMS audits can be conducted by hiring a contractor as a third party auditor or through in-house staff. Typically, an internal audit is conducted annually, while third party audits are conducted every three years.

The term “evidence” in the definition of audit refers to records, statements of fact or other verifiable information relevant to the audit criteria. The audit criteria may include policies, procedures, standards, laws and regulations, management system requirements, contractual requirements, or business codes of conduct. The audit criteria are specified in the audit plan.

One basic requirement of all audits is that an audit must be independent. Independence, in this context, means free from bias and conflict of interest. A facility operations manager, finance manager, quality manager, or other functional managers who are free from responsibility for the audited activity can be members of the EMS audit team. The roles and responsibilities of the audit team members must be specified in the audit plan.

C. Audit Plan

The audit plan defines the objectives of an audit. The audit's primary goal is to evaluate the extent of conformity of the facility's EMS with audit criteria, as well as the potential for improvement of the EMS. All EMS elements should be included in the audit plan.

Typically the audit plan should be reviewed and revised annually unless changes in state or federal regulatory requirements or process changes occur more frequently. After completing an audit, the audit team should review the audit plan and incorporate deficiencies and updates.

An EMS audit plan defines the process for scheduling, conducting, and reporting EMS audits. It specifies the employees involved in the audit, scheduled times, and the process that will be audited. Please refer to Table O – Sample of an Audit Schedule for examples of the discussions below.

Typically if there are processes with many aspects or there are a large number of processes, facilities will appoint an audit team, designating one member as the lead auditor. All members of the audit team must satisfy the "independence criterion described previously, have appropriate audit training and be competent to complete their assigned duties. The roles and responsibilities of each team member should be clearly defined in the audit plan.

Auditors should review the policies, procedures, standards, regulatory requirements, prior audit reports, and other pertinent information before performing an audit. A pre-audit meeting with the operation supervisor should be held to review the plan, and to discuss the scope of the audit.

The audit dates should be scheduled to ensure that all EMS elements and related operations are audited at least once a year. The audited operations should be notified at a reasonable time prior to the audit and logistical arrangements made, if needed (records gathered or temporary space made available within a department.). The lead auditor is responsible for the timely completion of the audit cycle (including the audit, audit report, and any feedback to the audited operations). The resulting corrective actions are then the responsibility of the audited departments.

The objective of an EMS audit is to evaluate the conformity of the facility's EMS with audit criteria. If the audit objectives include checking corrective actions for nonconformance from previous audits, this should be stated, and this statement can be written in the "Notes" column. See Table O – Sample Audit Schedule for the format. Other items which may be placed in the "Notes" column may include logistic arrangements, matters related to confidentiality or audit follow-up actions.

Table O – Sample Audit Schedule

Audit Schedule for XYZ Facility						
Dept to be Audited	Operations to be Audited	Lead Auditor	Audit Team Members	Duties	Scheduled Date	Notes
Warehouse	Electricity Use	John Smith	Karen Black	Notify Supervisor	05/18/13	Need digital recorder; use of quiet space in office area of main warehouse.
			Mark Simpson	Gather prior audits		
			Walter Stone	Gather equipment		
	Ventilation Emission		Mark Simpson	Gather prior audits	05/20/13	Same as 05/18/13
			Walter Stone	Meet with Supervisor		
Audit Schedule for XYZ Facility						
Maintenance	UST Leak Potential	John Smith	Mark Simpson	Notify Supervisor	05/23/13	Need laptop, digital recorder and office space in Building B - West wing area
			Karen Black	Gather reports		
			Walter Stone	Review prior audits		
Audit Schedule for XYZ Facility						
Boiler	Air Emissions	John Smith	Walter Stoner	Notify Supervisor	05/27/13	Need laptop, digital recorder and office space in Building B – East wing area
			Karen Black	Gather Blueprints		

D. Developing an Audit Procedure

Auditors should use the company's overall standard guidance or audit procedure. Audit procedures must clarify that the goal of the audit is to evaluate the implementation and maintenance of the company's EMS. It should also specify how results are recorded, reported and communicated. The audit process is designed to determine whether the company is in conformance with the EMS requirements. If nonconformance items are discovered, corrective and preventive actions should be identified. All audit information must be documented.

The audit procedure also provides guidance on the information that will be collected. The information gathered, or the audit evidence, can be used to determine which EMS objectives and targets are met, and if the system is efficient.

A sample of a simple EMS audit procedure is provided below.

Procedure No:	EMS-8
Issue Date:	January 1, 2013
Revision No:	Original (1, 2, 3 as changes are made)
Title:	Process for an EMS Audit
Approved By:	John Doe (name of final approver)

1. Purpose

The purpose of this procedure is to establish and maintain an EMS Auditing Procedure for XYZ Facility. The procedure defines the process for conducting, recording, and reporting of in-house EMS audits.

2. Scope

This procedure contains provisions to conduct an EMS audits to ensure that the EMS is properly implemented and maintained by evaluating system efficiency, reviewing environmental policy, evaluating objectives and targets, assessing whether documented EMS procedures are being followed, identifying nonconformance with EMS requirements, and whether relevant corrective actions in the system are taken whenever necessary.

3. Procedure

The EMS audit is to cover the following elements:

- *Environmental policy
- *Environmental program development – environmental aspects, objectives, and targets
- *Operational control – operational procedures and work instructions
- *Employee training and tracking
- *Internal and external communication

- *Emergency preparedness and response.
- *Records and record keeping
- *EMS audits.

- 3.1. The EMS audit sheet is to be used to conduct the audit.
- 3.2. Before conducting the audit, a pre-audit conference is scheduled with the operation supervisor, or appropriate personnel, to review the plan for the audit.
- 3.3. Once the audit is done, the completed EMS audit sheet is used as the draft EMS audit report.
- 3.4. Any discrepancies, exceptions or noncompliance issues identified in the audit are to be summarized in the EMS audit sheet, as well as areas of improvement that needs to be pursued in regard to environmental management.
- 3.5. A post-audit meeting among members of the audit, including the operation supervisor, or appropriate personnel, is conducted to discuss findings, conclusions and recommendations of the draft EMS audit report. Once a consensus on the draft has been reached, the report is finalized as the EMS audit report.
- 3.7. The EMS audit report, in the form of the completed EMS audit sheet, is communicated to management for review.

4. Updates and Reviews

This audit protocol will be reviewed and updated annually, or as necessary because of process changes or changes in the regulatory requirements.

5. Responsibilities

The updates of this EMS audit procedure must be approved by the EMS manager.

6. Records

The audit reports and any documentation resulting from the audit will be kept in the EMS file.

End of Procedure EMS-8

E. Performing an EMS Audit

Auditors must obtain copies of all documented procedures, training records, or other materials relevant to the audit. Prior to conducting the audit, the documentation for the audited area, past audits, and the company's EMS audit sheet should be reviewed.

The following section provides a sample of an EMS Audit Sheet. The guidance may require modifications in order to meet the specific facility audit objectives. This simple guidance covers eight EMS elements:

1. Environmental policy
2. Environmental program development: aspects, objectives, and targets
3. Operational control: procedures and work instructions
4. Employee training and tracking
5. Internal and external communication
6. Emergency preparedness and response
7. Records and record keeping
8. EMS audits

The last portion of the sample audit sheet is a sample audit summary. This sheet is used to compile the areas of non-conformance or improvements that were noted during the completion of the audit.

Table P - Sample Audit Sheet

<h2 style="margin: 0;">EMS AUDIT SHEET</h2> <h3 style="margin: 0;">XYZ FACILITY</h3>	
Date of Audit: _____	Lead Auditor: _____

Use this sheet and answer the following questions regarding the eight EMS elements at the audited facility. If any answer is “No,” a non-conformance to the requirements of an EMS exists.

1. Environmental Policy

The purpose of auditing this EMS element is to ensure that policy is up-to-date and still appropriate to the nature and scale of current processes, products, and services. It is also used to verify that the policy is communicated to employees and available to the public.

No.	Questions	Yes	No	Notes
1	Has an environmental policy been developed and approved by an appropriate official?			
2	Does the policy contain ALL of the following? a. Compliance with applicable environmental laws and regulations b. Promotion of pollution prevention c. Commitment to continual improvement			

No.	Questions	Yes	No	Notes
3	Is the policy still appropriate to the nature and scale of current processes, products and services?			
4	Does the new employee training cover the environmental policy?			
5	Are existing employees aware of the policy's existence and its general content?			
6	Is there a mechanism in place for the policy to be made available to the public?			

2. Environmental Program Development

The purpose of this audit section is to ensure that the objectives and targets reflect the facility's commitment to regulatory compliance, pollution prevention, and continual improvement. This form is used to verify that the targets are specific, measurable, and with deadlines. It is also used to verify that the program is evaluated on a periodic basis and results are communicated to top management.

No.	Questions	Yes	No	Notes
1	Has an EMS procedure been developed to identify aspects, impacts, objectives and targets?			
2	Is the procedure reviewed and updated on a periodic basis, or when changes occur in facility operations (chemical use, process changes, production level, etc)?			
3	Have the aspects of a facility's processes, products, and services that have significant impacts been identified?			
4	Have objectives and targets been identified for the processes, products, and services of significant impact?			
5	Are the objectives and targets consistent with the facility's environmental policy?			
6	Does each objective have specific and measurable targets, and the methods to achieve targets with assigned deadlines and designation of responsibility for achievement?			
7	Is progress being measured toward achieving the objectives and targets?			

No.	Questions	Yes	No	Notes
8	Is progress being measured on a periodic basis?			
9	Have corrective actions been initiated for areas not meeting objectives and targets?			
10	Have the results been reported to top management?			

3. Operational Control

The audit on environmental control attempts to ensure that the written operational procedures and work instructions represent current practice, and that all operations associated with the significant environmental aspects are addressed in the procedures and work instructions.

No.	Questions	Yes	No	Notes
1	Have procedures and work instructions been written for all operations of significant aspect?			
2	Do the procedures and work instructions monitor the operations?			
3	Do the procedures and work instructions ensure that the operations remain within acceptable parameters?			
4	Do the procedures and work instructions include provisions to implement prompt correction if a deviation occurs?			
5	Do the procedures and work instructions mandate a review of records and reports associated with the operations?			

4. Employee Training and Tracking

The purpose of this audit section is to ensure that the training has taken place and the employees have been trained properly, Verify that training documentation has been developed and maintained and has been kept current with respect to any hiring, departures, reorganizations, or new requirements.

No.	Questions	Yes	No	Notes
1	Have procedures been developed to identify and track the environmental training needs of all personnel who have responsibility for processes that have significant environmental impact?			

No.	Questions	Yes	No	Notes
2	Do the training and tracking procedures contain provisions to identify the type and frequency of training?			
3	Do the procedures identify who needs training?			
4	Do the procedures contain a mechanism to track training of employees?			
5	Do the procedures contain provisions for review and update of training requirements?			
6	Do the procedures include appropriate training required by legal training requirements? (Such as: RCRA, SPCC, SWPPP, OSHA, etc.)**			
7	Do the training and tracking procedures include provisions to require employee training on EMS procedures?			
8	Do the procedures contain provisions to require training for new employees that informs them about the facility's environmental policy and about new employees' duties within the EMS?			

** RCRA: Resource Conservation and Recovery Act
 SPCC: Spill Prevention Control Countermeasures
 SWPPP: Storm Water Pollution Prevention Plan
 OSHA: Occupational Safety and Health Administration

5. Internal and External Communication

The objective of the audit on communication is to ensure that the communication procedures are followed. Documentation of the receipt and responses to inquiries must be maintained. It is important to determine how inquiries are documented and referred to appropriate personnel. Communication programs must be reviewed and the effectiveness evaluated.

No.	Questions	Yes	No	Notes
1	Have communication procedures of the EMS been developed and implemented?			
2	Do the procedures identify the method and type of communication?			
3	Do the procedures identify the initiator and recipient of the communication?			

No.	Questions	Yes	No	Notes
4	Do the procedures mandate the documentation of the receipt and responses to inquiries?			
5	Do the procedures contain a provision for referral of inquiries?			
6	Do the procedures provide for review and updates to improve communication?			
7	Do the procedures include a requirement that any change to the EMS or any of its facets be communicated to the appropriate personnel?			
8	Does the documentation system show that communication is conducted according to the procedures?			

6. Emergency Preparedness and Response

The goal of this audit section is to determine that the current emergency response plan(s), equipment maintenance programs and emergency identification, prevention (including fire drills), and mitigation programs, have been implemented and maintained. The review should include regulatory-based and facility-specific programs. It is also necessary to determine if emergency response procedures are available and if personnel understand and are trained in their roles. Finally, verify if facility changes have been reviewed.

No.	Questions	Yes	No	Notes
1	Have procedures (and/or an emergency response plan) been developed to respond to and report accidents, spills, malfunctions, process upsets, and other emergency situations?			
2	Do the procedures provide for notification and reporting of accidents, spills, fires, or emergency situations?			
3	Do the procedures contain a provision to mitigate or clean up related environmental impacts?			
4	Do the procedures provide for investigation of causes of accident and evaluation of effectiveness of response?			
5	Are regulatory requirements for the facility included in the procedures?			
6	Have arrangements been made with the local emergency responders?			

No.	Questions	Yes	No	Notes
7	Have emergency response drills been conducted pursuant to the procedures?			
8	Have emergency responders been adequately trained for emergency response actions?			
9	Are emergency response instructions available in designated locations?			
10	Is emergency response equipment maintained and employees trained on location and use?			
11	Do the procedures contain a provision for a review and update to accommodate facility changes?			
12	Does the documentation system indicate that all procedures for preparedness and response are implemented pursuant to the procedures?			

7. Records and Record Keeping

This audit section should help determine if the procedures for records and record keeping are appropriately developed, maintained, implemented and followed. Ensure that they are available and updated to accommodate facility changes. Verify that the record retention procedure is maintained and followed.

No.	Questions	Yes	No	Notes
1	Has a procedure for tracking records been developed?			
2	Have the types of records to be kept been identified?			
3	Has a system for record identification and indexing the records been developed?			
4	Is there a procedure to remove obsolete records and record destruction?			
5	Has a procedure for establishing reporting and Record keeping been developed to document the environmental status of all activities?			
6	Are there provisions to update the procedures to accommodate facility changes?			
7	Does the documentation show that reporting and record keeping has been implemented according to the procedures?			

8. EMS Audits

This audit section will ensure that the EMS audit program is conducted according to the procedure. The audits should be performed based on the established schedule, and any nonconformance should be referred to the corrective action system. Verify that the results of the EMS audits are communicated to management.

No.	Questions	Yes	No	Notes
1	Are procedures in place to perform an EMS audit for the facility?			
2	Do the procedures explain the objective of the audit?			
3	Do the procedures contain the audit schedule?			
4	Do the procedures include a provision of methods of reporting audit results?			
5	Does the documentation system indicate that procedures for the EMS audit are implemented pursuant to the procedures?			
6	Does the documentation system show that non-conformance issues are identified and referred to the corrective action system?			
7	Does the documentation system verify that non-conformance issues are promptly corrected?			
8	Does the documentation system show that the audit results are communicated to management?			

Once the audit is completed, results of the audit need to be compiled into a summary format that will be the basis for the final audit report. Again, just as with the audit sheet, specific content may need to be used to reflect the true nature of the facility. An audit summary for our sample company is shown on the following page.

Table Q - Audit Summary

<p>EMS AUDIT SUMMARY</p> <p>XYZ FACILITY</p> <p>Signature of Auditor: _____ Date: _____</p>

No.	Category
1	Non-conformance issues observed during the audit. a. First item b. Second item...etc
2	Areas where non-conference may exist, but need further information for confirmation a. First item b. Second item...etc
3	Does the documentation system indicate that procedures for the EMS audit are implemented pursuant to the procedures? a. First item b. Second item...etc

F. Corrective Action

The results of the audit will indicate if the audit evidence conforms to the audit criteria. The audit also provides recommendations for areas of improvement. Management will review the audit conclusions and provide decisions and actions related to possible changes to environmental policies, objectives, targets, and other elements of the EMS consistent with the commitment to continual improvement.

Non-conformance can occur due to violations of any legal requirements, process changes in a significant operation, or violations of EMS procedure (examples: work instructions, calibration, or record keeping requirements are not followed). Non-conformance can be detected through an EMS audit, or by employees that discover a deviation from their daily activities.

When non-conformance occurs, the facility has to identify the cause and evaluate necessary corrective action. The corrective action chosen should be appropriate for the environmental impact encountered. The supervisor for the area of non-conformance and the EMS manager should monitor the corrective action.

The corrective action may involve modifying existing control mechanisms to avoid repetition of the non-conformance. Since these modifications would involve the record keeping portion of the EMS, changes in the written procedures resulting from the corrective and preventive action must be recorded and put on file.

To address non-conformance, the facility should have a procedure which defines responsibility and authority for:

1. handling and investigating nonconformance,
2. taking action to mitigate any impacts caused by nonconformance, and
3. initiating and implementing corrective and preventive action.

A sample of a simple non-conformance procedure is provided in the following section.

Procedure No: EMS-9
Issue Date: January 1, 2013
Revision No: Original (1, 2, 3 as changes are made)
Title: Investigating and Correcting Non-Compliance
Approved By: John Doe (name of final approver)

1. Purpose

The purpose of this procedure is to define authority, responsibility and methods for investigating and correcting non-conformance with EMS requirements.

2. Scope

This protocol contains provisions to initiate and complete corrective action and to review corrective actions for effectiveness.

3. Procedure

3.1. Employees that discover a deviation from operations and activities or a violation of regulatory requirements should immediately notify their supervisor.

3.2. The supervisor will initiate corrective action by identifying the problem, evaluating potential corrections, deciding on the corrective action, including an implementation timeline and assignment of tasks, and take the corrective action. The supervisor will record these activities in the EMS corrective action form.

3.3. When the corrective action is completed, the supervisor will complete the EMS corrective action form, date it and submit the form to the EMS manager.

3.4. The EMS manager will review the corrective action form for effectiveness. If necessary, changes in procedures will be made to keep the non-conformance from happening again.

3.5. All corrective actions should be logged on the EMS corrective action log.

4. Updates and Reviews

This protocol and methods used for corrective actions will be reviewed annually, or upon changes in regulatory requirements and operational changes.

5. Responsibilities

5.1. Employees are responsible for notifying supervisors of non-conformance they discover.

5.2. The supervisor or the EMS manager can initiate and log a corrective action.

6. Documentation

The corrective action documentation will be kept in the EMS file.

7. Reference

The EMS corrective action form and the EMS corrective action log are provided as in this procedure for reference.

EMS CORRECTIVE ACTION FORM

XYZ FACILITY

Action Requested by:		Date:	
Area of Non-Conformance:		Request #:	

Statement of Problem:

Problem Analysis:

Corrective Action Taken: _____ **Date:** _____

Changes Identified as Result of Corrective Action:

Review of Effectiveness:

Signature of Supervisor: _____ **Date:** _____

EMS CORRECTIVE ACTION LOG XYZ FACILITY

Corrective Action Form Request #	Requested By	Request Date	Corrective Action Date	Completion Date	Review Summary
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

(Keep numbering consecutively)

End of Procedure EMS-9

G. EMS Feedback Summary

EMS feedback represents an important part of the EMS cycle. Through EMS feedback, management will have a better understanding of the scope and possible repetitive areas of non-compliance across all operational areas. This knowledge will allow them to provide sound decisions and actions related to possible changes to environmental policy, objectives, targets, and other elements of the EMS consistent with the commitment to continual improvement.

This guidance document was prepared to assist small- to medium-sized facilities establish and maintain an Environmental Management System (EMS). If you have questions regarding this document or with developing your EMS program, please contact one of ADEQ's P2 staff members.

Jeanine Inman, P.E.
P2 Program Engineer
JI1@azdeq.gov
602-771-2351

Farah Mohammadesmaeili, P.E.
P2 Program Specialist
FM4@azdeq.gov
602-771-2350

Linneth Lopez
P2 Program Specialist
LAL@azdeq.gov
602-771-4739

Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, AZ 85007