



**PDHonline Course C214V (6 PDH)**

---

# **Environmental Management System (Video Course)**

*Instructor: Jim Newton, P.E., DEE*

**2020**

**PDH Online | PDH Center**

5272 Meadow Estates Drive  
Fairfax, VA 22030-6658  
Phone: 703-988-0088  
[www.PDHonline.com](http://www.PDHonline.com)

An Approved Continuing Education Provider

## Utilizing a Management System to Improve Water and Wastewater Operations

Jim Newton, P.E., BCEE

© 2011 1

## Effective Utility Management

■ Promoted by:

- US EPA
- Association of Metropolitan Water Agencies (AMWA)
- American Public Works Association (APWA)
- American Water Works Association (AWWA)
- National Association of Clean Water Agencies (NACWA)
- National Association of Water Agencies (NAWC)
- Water Environment Federation (WEF)

2

## Elements of EUM

■ 10 Key Attributes

■ 5 Keys to Success

3

## 10 Attributes

1. Product quality
2. Customer satisfaction
3. Employee and leadership development
4. Operational optimization
5. Financial viability

4

## Attributes continued

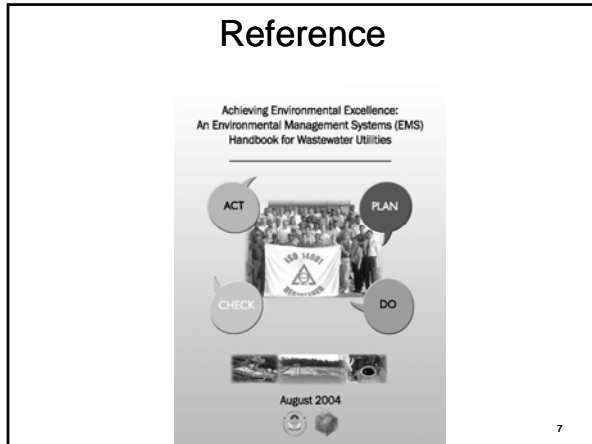
6. Infrastructure stability
7. Operational resiliency
8. Community sustainability
9. Water resource adequacy
10. Stakeholder understanding and support

5

## Keys to Management Success

1. Leadership
2. Strategic business planning
3. Organizational approaches
4. Measurement
5. Continual improvement programs (Management Systems)

6



**WHAT IS A  
MANAGEMENT  
SYSTEM**

8

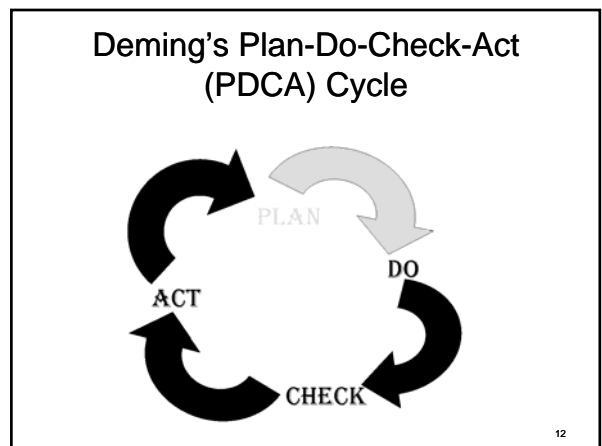
**Management System**

A set of management processes and procedures that allows an organization to analyze, control and reduce the impact of its activities.

9

- Common types of management systems**
- Environmental (ISO 14001)
  - Health and Safety (OHSAS 18001)
  - Quality (ISO 9001)
  - Energy (ISO 50001)
  - Sustainability
  - National Biosolids Partnership (NBP)
- 10

- Key Goals of a MS**
- Reduce footprint
    - Environmental
    - Health and Safety
    - Sustainability
  - Continually Improve
    - Environmental
    - Health and safety
    - Sustainability
    - Quality
- 11



### MS Includes

- Defining roles and responsibilities
- Identifying and prioritizing impacts
- Setting measurable objectives and targets
- Verifying and establishing operational controls
- Monitoring and measuring activities and progress
- Seeking continual improvement as a part of the review cycle

13

### MS

A system for identifying program and organizational issues and implementing improvements based on Deming's P-D-C-A model. The MS has 17 elements that help organizations achieve program policy commitments and program performance improvements.

14

### Typical MS Elements

|                                 |                                       |
|---------------------------------|---------------------------------------|
| Policy                          | Identifying Aspects                   |
| Legal and Other Requirements    | Objectives and Targets                |
| Management Program(s)           | Structure and Responsibility          |
| Training, Awareness, Competency | Communications                        |
| Documentation                   | Document Control                      |
| Operational Control             | Emergency Preparedness/Response       |
| Monitoring and Measuring        | Nonconformance and Corrective Actions |
| Records                         | Auditing                              |
| Management Review               |                                       |

15

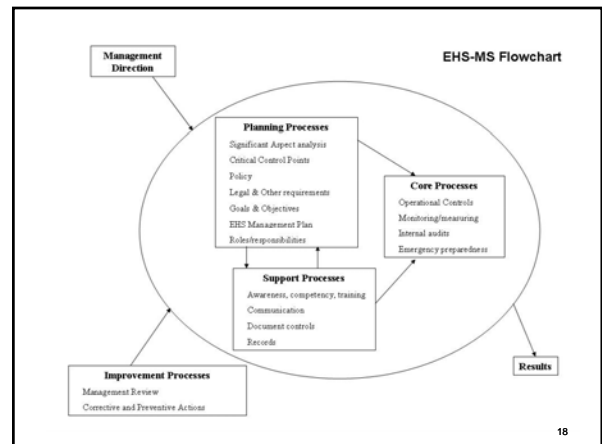
### KEY TERMS

|                |  |
|----------------|--|
| Mgt. Rep. (MR) | The clearly identified management system team leader who has the responsibility and management authority for implementing the MS from start to finish                            |
| Core Team      | A cross-functional team made up of individuals within the organization that helps facilitate MS implementation across the organization. They are the MS experts and cheerleaders |

16

## Environmental Management System

17



### What is an EMS?

A system for identifying environmental and organizational issues and implementing improvements based on Deming's Plan-Do-Act-Check model. The EMS has 17 elements that help organizations achieve environmental policy commitments and environmental performance improvements.

19

### An EMS does not

- Direct an organization to meet certain discharge or emission limits.
- Tell an organization how or what to manage.

20

### An EMS does

- Describe the internal framework that should be in place to have a proactive system to manage environmental issues
- Define the critical management elements and operational controls that must be in place and followed to control the impact an organization has on the environment
- Apply to all types of organizations and facilities, both large and small and public and private organizations

21

### EMS Elements

|                          |   |
|--------------------------|---|
| Environmental Policy     | A statement of commitment to the environment. Use this policy as a framework for planning and action. The policy is a direct reflection of the fundamental values of the organization |
| Environmental Aspects    | The environmental attributes of products, activities and services. Determine those that could have a significant impact on the environment  |
| Legal/Other Requirements | Identify and ensure access to relevant laws and regulations, as well as other requirements that the organization must meet and follow   |

22

|  |   |
|--|---|
| Objectives and targets                 | The environmental goals for the organization or facility, consistent with policy, environmental impacts and the views of interested parties |
| Environmental Management Program (EMP) | The plans of action necessary to achieve the objectives and targets   |
| Structure and Responsibility           | The roles and responsibilities for environmental management and provide appropriate resources for the program                               |
| Training, Awareness and Competence     | The program to ensure that employees are trained and capable of carrying out their environmental responsibilities under the EMS             |

23

|                      |   |
|----------------------|---|
| Communication        | The processes for internal and external communications on environmental management issues   |
| EMS Documentation    | The information on the EMS. Defined, consistent and provides an overview of the EMS's key policies, procedures and related documents (EMS Manual)         |
| Document Control     | The effective management of procedures and other system documents   |
| Operational Controls | The identification, planning of and managing of operations and services in line with the policy, priority environmental issues and objectives and targets |

24

|   |   |
|---|---|
| Emergency Preparedness and Response                   | The identification of potential emergencies and development of procedures for preventing and responding to them |
| Monitoring and Measurement                            | The monitoring of key activities and tracking performance   |
| Nonconformances and Corrective and Preventive Actions | The identification and correction of problems and the prevention of their recurrence                            |
| Records   | The maintenance and management of records (access, retention, disposition)                                      |

25

|                   |   |
|-------------------|---|
| EMS Audit         | The activity to periodically verify, internally and/or through a third party, that the EMS is operating as intended |
| Management review | To assess the organization's EMS with an eye toward continual improvement   |

26

### EMS Phases and Timelines

**Phase 1 – Getting Ready (~ 3 months)**

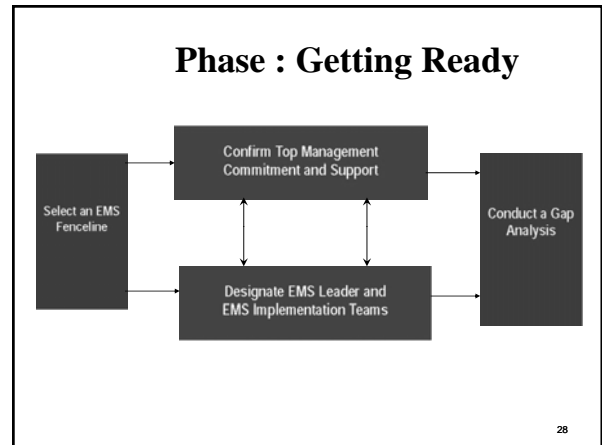
**Phase 2 – Planning (~ 6 months)**

**Phase 3 – Implementing (~ 3 months)**

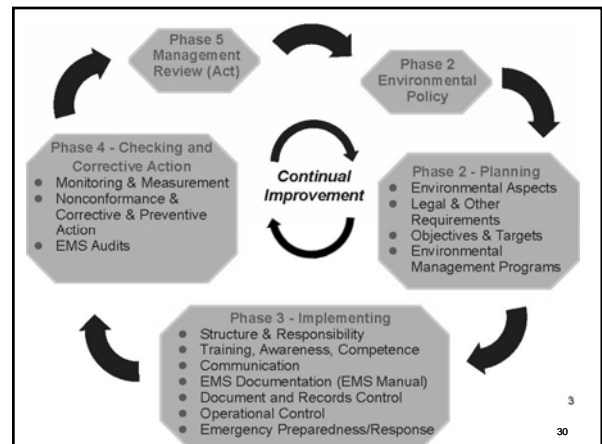
**Phase 4 – Checking and Corrective Action (~ 5 months)**

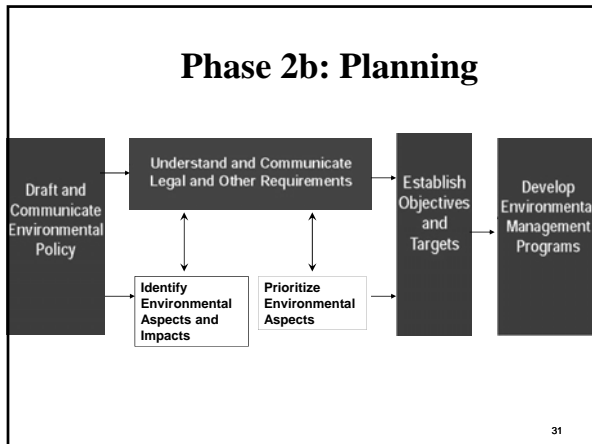
**Phase 5 – Management Review (~1 month)**

27



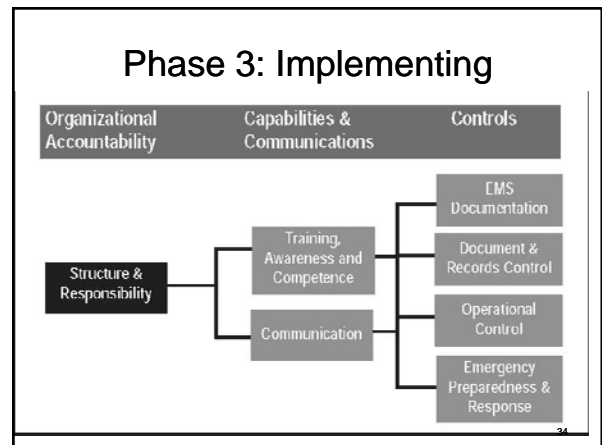
- ### Phase 1 Activities
- Select your EMS fenceline or implementation focus areas
  - Confirm commitment and support throughout the organization, especially from top management
  - Designate an EMS leader and form the EMS implementation team
  - Conduct a preliminary review of the EMS components already in place (gap analysis)
- 29





- ### Phase 2: Activities
- Draft and communicate the environmental policy
  - Create a procedure for understanding and communicating the legal and other requirements
  - Identify the environmental issues (both regulated and unregulated) of the operations and services
- 32

- ### Phase 2
- Develop a method for prioritizing the environmental aspects
  - Set realistic objectives and targets on the significant issues and environmental policy
  - Develop action plans (environmental management program) that will help meet the objectives and targets
- 33



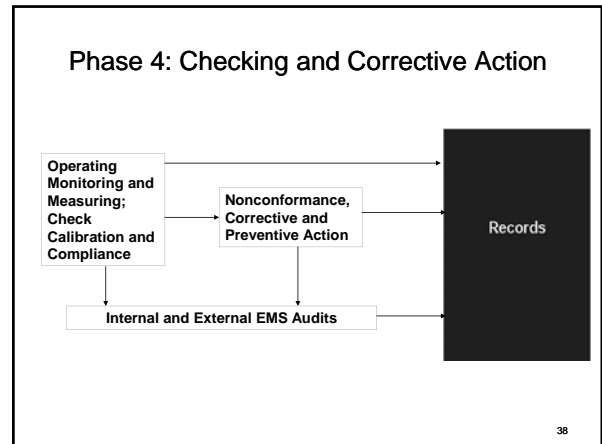
- ### Phase 3: Activities
- Clearly define roles and responsibilities particularly wrt significant environmental issues
  - Identify EMS training and awareness needs for all staff
  - Establish effective internal communication methods for information to flow top-down, bottom-up and across the entire organization
- 35

- ### Phase 3
- Establish ways to communicate effectively with external stakeholders
  - Establish operational controls for the operations determined to be significant
  - Establish a system ensuring documents and records are current, accessible and archived when appropriate
- 36

### Phase 3

- Identify potential emergency situations that could arise from day-to-day activities and operations, and review and create procedures or plans to address potential incidents
- Establish normalized baseline data for operations with environmental targets so that the targets can be measured and goals met or improved on

37



### Phase 4: Activities

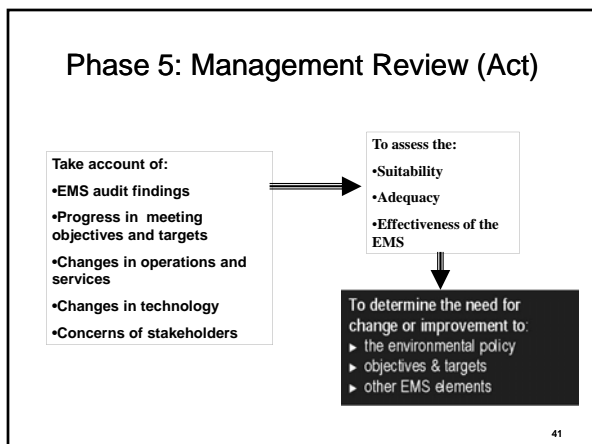
- Monitor and measure key characteristics of the management system
- Determine compliance status
- Ensure that instruments used for monitoring and measuring are calibrated

39

### Phase 4:

- Develop and implement procedures for handling EMS nonconformances
- Conduct internal and external (if desired) EMS audits
- Maintain EMS records

40



### Phase 5: Activities

- Judge the suitability, adequacy and effectiveness of the EMS
- Consider new organizational goals
- Consider new operations and other changes that need to be managed
- Apply lessons learned for continual improvement

42



### Reasons for an EMS

- To comply with environmental laws and regulations
- To improve how to manage environmental responsibilities
- To retain institutional knowledge
- To improve environmental performance

43

### Reasons

- To identify and effectively manage risks
- To improve public image
- To better communication channels to capture good ideas from frontline personnel for improving operations
- To welcome opportunities to reduce inefficiencies and save money

44

### Reasons

- To improve teamwork, communication and environmental understanding in daily operations and staff
- To improve competitiveness
- To reduce the risks of privatization
- To incorporate other initiatives such as asset management, CMOM, quality, health and safety

45

## Phase 1: Getting Ready

46

### Topics Covered

- Choosing the EMS fenceline
- Understanding organizational goals
- Top management commitment, involvement and visibility
- EMS program leadership
- Securing and maintaining employee buy-in

47

### Topics

- Conducting an EMS gap analysis or preliminary review
- Managing change
- Understanding the implementation strategy
- EMS information sources and resources

48

### Choosing a fenceline

- Example fencelines
  - Wastewater collection
  - Wastewater treatment
  - Biosolids treatment/disposal
  - Landfill operations
  - City governments
  - Solid waste collection
  - Solid waste recycling

49

### Kent County fenceline

- Wastewater collection
- Wastewater treatment
- Biosolids treatment/disposal

50

### Fenceline considerations

- Starting small is best
- Select one operation or department then expand
- Look for operations with most environmental aspects
- Look for operations with the greatest use of natural resources

51

### Considerations

- Look for operations with the most transferability
- Look for operations with the most receptive management
- Look for operations not currently undertaking other major activities, such as capital improvements

52

### Keys to getting fenceline buy-in

- Invite staff to a short EMS meeting with senior management visibly supporting
- Hold drop in brief discussions with supervisors, managers, staff
- Hang EMS posters and other informal awareness information

53

### Typical WTP organizational goals

- Improve documentation/ communications
- Develop and/or update SOPs
- Improve morale and teamwork
- Increase efficiency of operations
- Reduce energy consumption
- Enhance the public image
- Become proactive wrt compliance
- Become more competitive
- Become best in class

54

### Top Management Involvement

- Commitment
- Involvement
- Visibility

55

### Management Involvement

- Providing input and approving the policy statement
- Appointing the EMR
- Approving the EMS plans/programs
- Tracking EMS performance
- Being visible and involved
- Communicating support
- Regularly meeting with EMR

56

- Frequently asking employees about the EMS
- Expressing personal goals for the EMS to the EMS leadership
- Using the “bully pulpit” only when leader
- Providing human and financial resources
- Helping your EMS teams to manage change
- Rewarding, acknowledging and reinforcing the benefits that the EMS brings and the people who are making it happen

57

### EMS Leadership

- Environmental Management Representative (EMR)
- EMS Core Team
- EMS Site Implementation Team

58

### EMR (EMS Champion)

- EMS team leader, champion and expert
- Responsibility and authority for implementing and maintaining the EMS
- Authority is designated from management
- Make sure he/she has EMS training

59

### Typical EMR Responsibilities

- Build/lead the EMS Core team
- Plan the EMS project and implementation schedule
- Gather, organize and disseminate EMS information
- Delegate tasks and establish deadlines
- Facilitate top management visibility and involvement
- Obtain cross-functional support and buy-in
- Regularly meet and communicate with top management about the benefits and status of implementation

60

### EMR Qualification

- Knowledge of organization's business and management practices and core operations
- Environmental background
- Leadership and project management skills
- Systems thinker
- Good communicator up and down the ladder

61

### EMS Core Team

- Size depends on
  - Organizational structure
  - Specific employee skills and expertise
  - Organization's available resources
- Size ranges from 5-15, may be volunteers or assigned
- Kent County used area supervisors and top management

62

### Core Team

- Leadership role in
  - Planning the EMS project
  - Delegating the tasks
  - Establishing deadlines
  - Collecting and evaluating work
  - Providing training, guidance and assistance as needed
- Serves as the EMS Cheerleader
- EMR heads Core Team

63

### EMS Core Team Qualifications

- Knowledge of their operational and functional areas
- Good communicators and listeners
- Enthusiastic and committed
- Respected and trusted by employees and managers

64

### EMS Site Team

- May also be the Core Team
- Typically includes frontline employees
- Responsibilities:
  - Documenting the organizational activities and operations as process flow diagrams
  - Assisting with the identification of aspects/impacts
  - Providing input on environmental objectives
  - Developing work instructions and SOPs for significant activities
  - Disseminating information and good news about the EMS effort

65

### Securing/Maintaining Buy-In

- Need to overcome any resistance
- Get employees involved early and often
- Communicate and ask employees for their EMS goals

66

### Ideas for building a team approach

- Hold a kick off meeting
- Talk up the EMS
- Talk to middle management and line supervisors
- Asking front line employees for input and ideas
- Posting EMS signs around the facility
- Advertise early successes

67

### Gap Analysis

- Typically can find a number of elements already in place
- Preferable to conduct the analysis in house
- Usually conducted by EMR and some members of Core Team
  - Should have basic understanding of EMS
- Allows the EMR to involve some Core Team members
- Good opportunity for Core Team to work together
- Great tool to open dialogue between the Core Team and Site Team
- Gives organization of how much work is needed to complete the EMS

68

### After Gap Analysis

- Improved Core team dynamic
- Increased employee EMS awareness
- Communicated useful information about environmental issues
- Learned a lot about the EMS elements
- Learned the scale of the implementation effort
- Use a checklist to direct the efforts

69

### Managing Change

- Change is not easy or always welcome
- Keys to success
  - Secure active support from management
  - Establish early dialogue and lines of communication
  - Define opportunities for ownership and empowerment
  - Maintain consistency and visibility
  - Promote activity and involvement
  - Keep EMS jargon usage to a minimum

70

### EMS Costs

- Time from start to management review – 13-30 months
- Costs \$50,000 - \$200,000
- Total manhours – 1675-4300
- EMR time – 1,000-3,000 manhours
- Core Team Time – 1,800-2,500 manhours
- Consultant time – 100-500 manhours
- Senior Management – 8-100 manhours

71

### EMS Resources

- USA EPA – [www.epa.gov](http://www.epa.gov)
- PEER Center – [www.peercenter.net](http://www.peercenter.net)

72

Phase 2

# PLANNING

73

## Planning Elements

- Environmental Policy
- Legal and Other Requirements
- Aspects and Impacts
- Objectives and Targets
- Environmental Management Programs

74

## Environmental Policy

- Statement of commitment to the environment
- Everyone in organization should understand
- Signed by top management
- Foundation of the EMS
- Provides the environmental vision
- Should be consistent with other strategic environmental priorities

75

## ISO 14001 Policy Commitments

- Pollution prevention
- Continual improvement
- Compliance with relevant laws and regulations

76

## Developing Environmental Policy

Step 1: Review current policies

Step 2: Draft an environmental policy

Step 3: Check your policy for EMS conformance

Step 4: Finalize the policy

Step 5: Communicate the policy

Step 6: Review policy for effectiveness

77

## Step 1 Considerations

- Probably have some environmental or organizational policies in place
- Make sure new one is consistent with others
- Document what is already in place
- Leverage the current policies and build on them
- Use examples provided in reference handbook

78

### Step 2 Considerations

- Avoid a policy that is vague
- Avoid a policy that can apply to any organization
- Develop policy to be specific to the goals of the organization
- Designate a Core Team member to draft policy
- Incorporate current business commitments and/or organizational and environmental goals
- Get input from top management
- Seek input from employees
- Incorporate ISO 14001 commitments

79

### Step 3 Considerations

- Is there top management support and a signature/date?
- Is there a commitment to the legal requirements, continual improvement and pollution prevention?
- Is the policy communicated to employees? How?
- Has the communication been effective?
- Is the policy available to the public? How?

80

### Step 4 Considerations

- Does the policy accomplish environmentally what the organization wants
- Check it for conformance
- Rewrite if needed
- Have top management sign and date
- Post policy and communicate

81

### Step 5 Considerations

- Communicate to employees
- Ensure all employees understand the policy
- Make sure employees understand how the policy relates to their work
- Conduct training to introduce the policy, explain its purpose and answer any questions

82

### Step 6 Considerations

- Review policy during management reviews
- Consider how to demonstrate that the commitments are being implemented

83

### Avoid these

- Making policy too long
  - Make it simple, with a straight forward and realistic view of the environmental and EMS purposes (one page or less)
- Not defining the fence line
- Rushing the drafting policy
  - The policy defined the management commitment to the EMS and sets the framework for the EMS

84

### Keys to success

- Use existing policies and organizational goals
- Make sure employees know they don't have to memorize the policy
- Ensure top management listens to the working conditions and concerns of all employees

85

### Kent County Policy

- *Comply with applicable environmental, health and safety laws and regulations*
- *Have practices that are consistent with the principles of the National Biosolids Partnership's Code of Good Practice.*
- *Improve continually its environmental, health and safety performance.*
- *Readily communicate with interested stakeholders about its environmental, health and safety performance.*
- *Promote pollution prevention, energy conservation, and effective health and safety practices, including the prevention of injury and ill-health.*
- *Support sustainability efforts that follow the four system conditions in The Natural Step framework.*

86

### Legal and Other Requirements

- Legal requirements
  - EPCRA
    - Tier II
    - TRI
  - CWA
    - NPDES
    - SPCC
    - Pretreatment
    - Stormwater
  - CAA
    - Title V
    - Air permits
    - HAP
  - RCRA
  - TSCA
  - Coastal Zone management
  - Zoning Rules

87

### Other Requirements

- Trade association commitments
  - NBP
  - AWWA
  - APWA
- Local regional environmental and community initiatives
- Voluntary programs
  - Performance Track
  - Energy Star
  - Sustainability

88

### Steps for LOR

- Step 1: Identify and maintain LOR
- Step 2: Develop a system procedure for identifying the LOR
- Step 3: Check the LOR for EMS conformance
- Step 4: Communicate LOR

89

### Step 1 Considerations

- Document a summary of all the LOR
- Inform regulators of EMS being implemented
- Provide training and communicate requirements to employees in regulated areas

90



## Questions to ask

- Who is responsible for LOR compliance?
- What information sources do you find most useful and user friendly?
- Where is the information stored and in what form?
- Is there an electronic database of LOR? Paper copies?
- Do employees know how to access information?
- How often is the information ensured to be current?
- Who is responsible for communicating LOR?

91

## Sources of LOR

- Local Government Environmental Assistance Network (LGEAN), [www.lgean.org](http://www.lgean.org)
- US EPA, [www.epa.gov](http://www.epa.gov), US OSHA, [www.osha.gov](http://www.osha.gov), US DOT, [www.dot.gov](http://www.dot.gov)
- Federal Register Notices
- Trade Associations (AWWA, WEF, AMSA, NRWA)
- State agencies

92

## Step 2 Considerations

- System procedure should clearly define
  - What to do
  - Roles and responsibilities
  - When to do it
  - How the information will be communicated
  - Where the information will be stored
- Document should be
  - Consistent
  - Easily accessible
  - A clear guide

93

## Step 3 Considerations

- Check:
  - Is there a list of all applicable LORs?
  - Can employees who need the information access easily?
  - When is the next review date?
  - Have the requirements been communicated and understood? By employees and contractors?
  - Can employees whose work is governed by LORs describe how the law affects what they do?

94

## Step 4 Considerations

- Communicate what the LORs mean
- Communicate how the LORs affect their job
- Keep it in plain English and avoid legalese

95

## 3 Lessons Learned

- Include clearly defined roles and responsibilities in the methods to track requirements
- Consider using a third party to document the baseline of LORs (environmental audits)
- Conduct more frequent reviews of LORs than other EMS elements
- ISO 14001 requires an annual compliance assessment

96

### Avoid

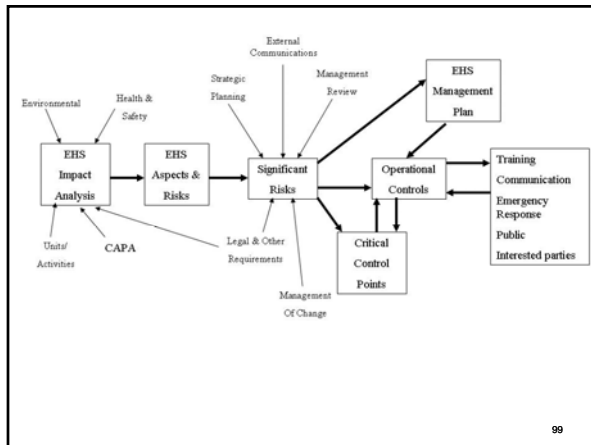
- Making the LOR review a one time only activity
- Overlooking the communication of applicable LORs to floor employees
- Treating the other requirements and voluntary initiatives as minor agreements

97

### Environmental Aspects/Impacts

- Environmental Aspects – Elements of an organization’s activities, products or services that can interact with the environment (Cause)
- Environmental Impact – Any change to the environment (adverse or beneficial) that results from an organization’s activities, products or services (Effects)

98



99

### Steps

- Step 1: Clarify EMS jargon
- Step 2: Determine core operations and supporting activities
- Step 3: Construct input/output diagrams
- Step 4: Develop a matrix of aspects and impacts
- Step 5: Prioritize aspects/impacts
- Step 6: Develop a system procedure
- Step 7: Check for EMS conformance
- Step 8: Review and revise aspects/impacts

100

### Step 1 Considerations

- Jargon is one of the first hurdles
- Need to clarify aspects and impacts
- Aspects = Cause
- Impacts = Effects
- Need to identify how organization affects the surrounding environment
- Better able to define relationship better able to manage and control impacts

101

### Examples

| Activity                       | Aspect                                   | Impact  |
|--------------------------------|--|---|
| Burning of fuel                | Air Emission, carbon dioxide             | Degradation of air quality  |
| Transport of diesel fuel       | Spills and leaks                         | Soil and groundwater contamination  |
| Maintenance of fleet vehicles  | Used oil recycling                       | Conservation of natural resources (petroleum)   |
| Equipment maintenance          | Solid waste generation                   | Reduction in landfill space or increase in landfill space (recycling)                   |
| Facility boilers               | Electricity use from gas or diesel fuels | Reduction in natural resources  |
| Office/Administrative Services | Recycling paper                          | Conservation of landfill space, conservation of natural resources, improved air quality |

102

### Step 2 Considerations

- What activities and operations are covered (fenceline)
- Keep the process to a smaller unit
- Too large a fenceline can make it too difficult to identify aspects/impacts
- Ensure activities have potential or direct impacts on environment
- Make the method of ranking simple and easy to understand
- Keep the aspect analysis procedure flexible – if it is not working change it

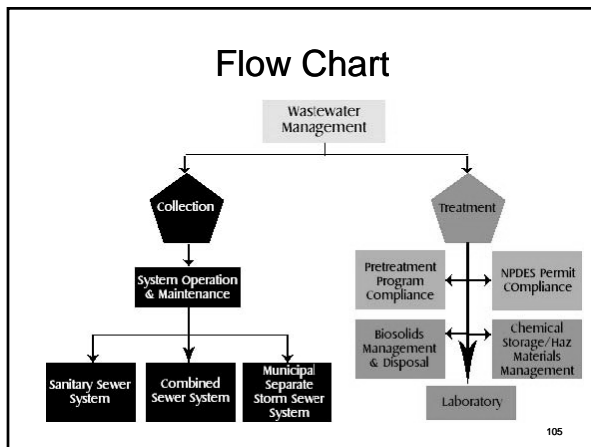
103

### Step 3 Considerations

- Helps to understand inputs, outputs, byproducts and wastes from activity
- Construct a flow chart of the fenceline
- Next construct an input/output diagram
- Involve EMS site team and frontline personnel
- May want to add in
  - Regulated aspects
  - Non-regulated aspects
  - Emergency situations
  - Positive impacts

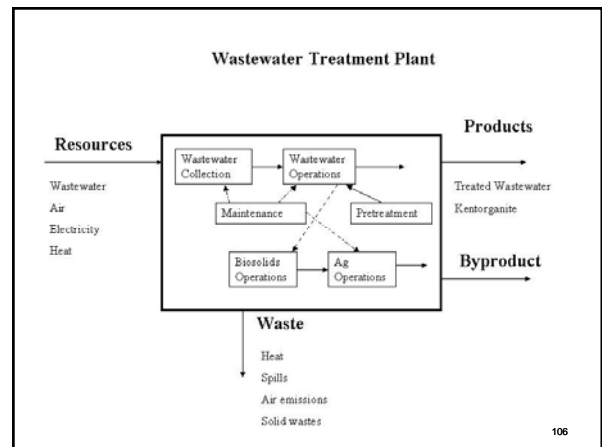
104

### Flow Chart



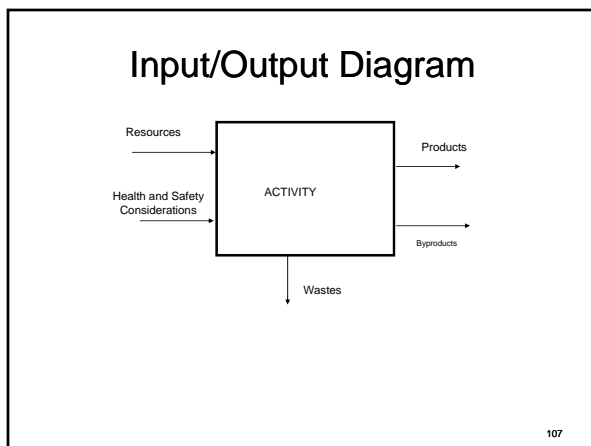
105

### Wastewater Treatment Plant



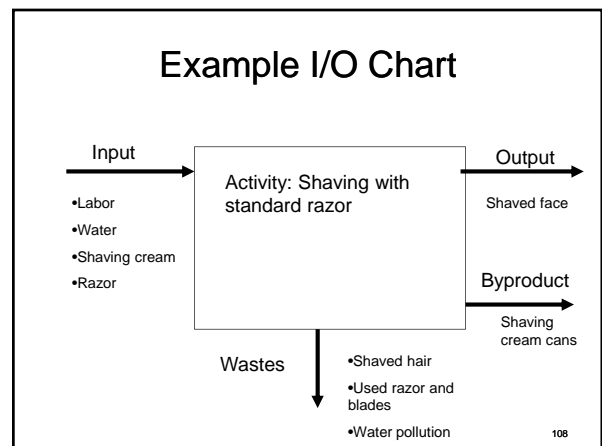
106

### Input/Output Diagram

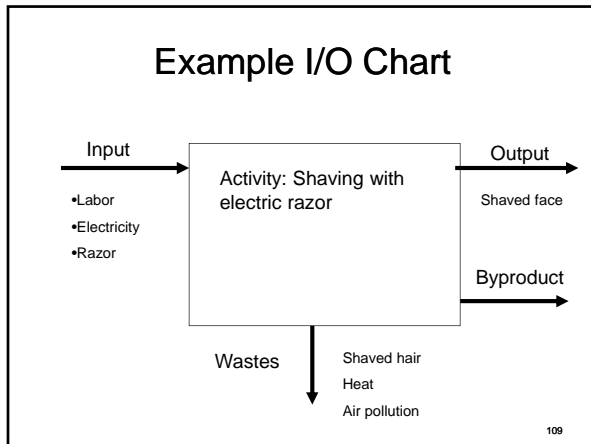


107

### Example I/O Chart



108



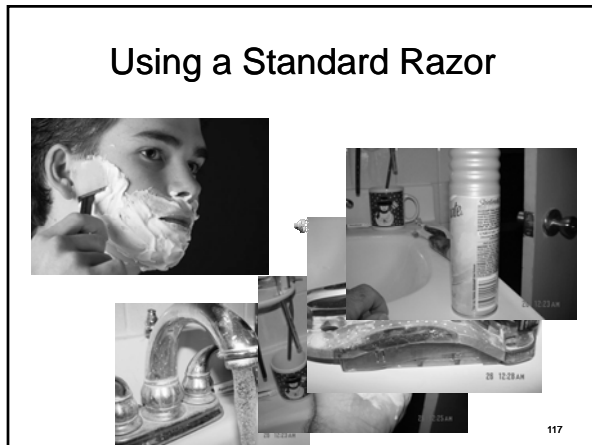
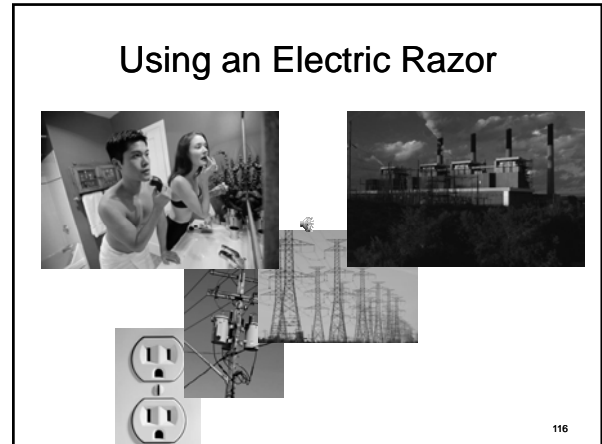
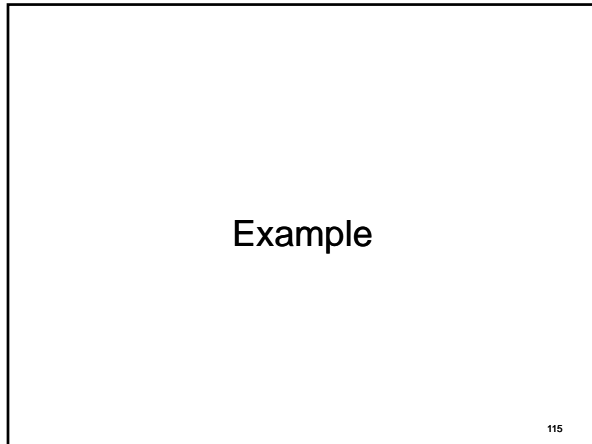
- ### Step 4 Considerations
- Get together with employees in activity areas and talk about inputs and outputs
  - Develop a matrix of activities, aspects and impacts
  - Add processes associated with selected activity
  - Add aspects and impacts to matrix
  - May want to involve outside stakeholders in the process
- 110

- ### Step 5 Considerations
- Determine criteria to rank each activity
    - Examples:
      - Impact to natural resources
      - Impacts to land, water or air
      - Cost
      - Probability of Occurrence
      - Volume
      - Toxicity
      - Regulated
      - Public impact
      - Nuisance issues
      - Human health impacts
      - Health and safety of employees
- 111

- Determine how the criteria will be used
    - Examples scale from 0-5 (no impact – major impact)
    - Determine weight of each criteria if desired
    - Determine if some factors can be combined
    - Avoid getting too complex
    - Keep the number of criteria small
    - Establish ranking number where significance can be applied (keep the number of significant aspects to around 5)
    - Don't spend too much time arguing about the numbers (have EMR lead the discussion among Core team members)
    - May want to involve consultant help
- 112

- ### Avoid
- Breaking aspects into too much detail
  - Making the significance threshold too low or high
  - Getting bogged down in the assigning of scores
- 113

- ### Keys to Success
- Educate the Core Team and all employees on their roles in aspect/impact analysis
  - Defining significance ranking criteria for all employees who are participating in analysis
  - Create cross-functional teams in reviewing the analysis
- 114



### Environmental Aspects

| Activity                    | Aspects  | Impact  |
|-----------------------------|--|---|
| Shaving with electric razor | Electricity, air pollution, water pollution        | Reduction in natural resources, degradation of air and water quality                    |
| Shaving with standard razor | Solid waste, water usage, razor and blade disposal | Reduction in landfill space, reduction in water quality, reduction in natural resources |

118

- ### Significance Criteria Used
- Changes to air quality
  - Changes to water quality
  - Direct exposure to chemical
  - Changes in habitat
  - Nuisance
  - Depletes natural resources
  - Is it regulated
  - Is it a critical control point
  - Frequency/probability of it occurring
- 119

- ### Ranking Continued
- Points assigned
    - 0-5 (no impact to greatest impact)
  - Critical control point
    - Yes - 3
    - No - 0
  - Regulated
    - Yes -5
    - No - 0
- 120

### Significance Criteria

| Criteria          | Electric shaving | Standard shaving |
|-------------------|------------------|------------------|
| Air quality       | 5                | 0                |
| Water quality     | 0                | 3                |
| Chemical exposure | 0                | 2                |
| Habitat           | 2                | 0                |
| Nuisance          | 0                | 0                |
| Natural resources | 2                | 3                |
| Regulated         | 0                | 0                |
| CCP               | 0                | 0                |
| Frequency         | 4                | 4                |
| Total             | 13               | 12               |

121

### Example 2

| Activity                            | Aspect                               | Impact   | Land Impact | Air Impact | Water Impact | Health & Safety | Total Score |
|-------------------------------------|--------------------------------------|--|-------------|------------|--------------|-----------------|-------------|
| Operate and Maintain a Pump Station | Sanitary Sewer System Overflow (SSO) | <ul style="list-style-type: none"> <li>■ Degradation of Water/Land</li> <li>■ Impact on Public Health</li> </ul> | 5           | 1          | 5            | 5               | 16          |

122

### Step 6 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

123

### Step 7 Considerations

- Check:
  - Is the methodology sound?
  - Are all fence-line operations and activities included?
  - Is there a list of significant aspects?
  - Does the procedure account for changes to operations and activities?

124

### Step 8 Considerations

- Keep the information up to date
- Review at least once a year
- Review when operations and/or activities change
- Conduct for new operations and/or activities

125

### Additional reference

EMS Aspects Identification and Prioritization Workbook

by  
GETF

Available from the US EPA's PEER Center at

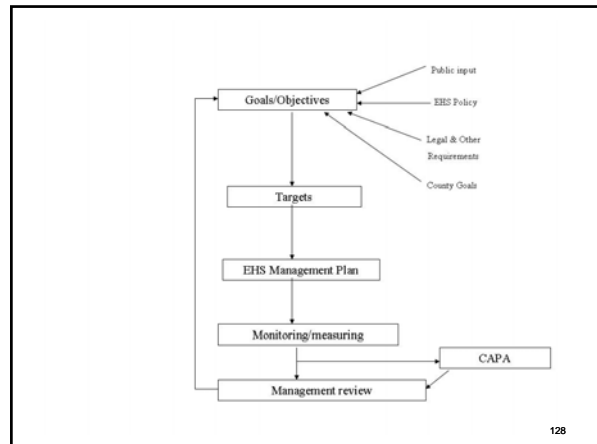
[www.peercenter.net](http://www.peercenter.net)

126

### Objectives and Targets (Os&Ts) and Environmental Management Programs (EMPs)

- Os & Ts are an opportunity to identify where to be wrt to significant aspects over the next several years
- All significant aspects must be managed
- Management can be via operational controls or Os & Ts

127



- **Objective:** the internal goal the facility establishes to improve its environmental performance based on an environmental policy
  - Reduce air emissions generated from burning diesel fuel
- **Target:** A measurable performance requirement that arises from an objective
  - Reduce sulfur dioxide from the burning of diesel fuels by 50% from 2002 levels
- **Performance indicator:** A measurement tool that can be used to evaluate and measure environmental performance in relation to a specific target
  - Measuring the emissions of sulfur dioxide per year from baseline in order to compare with our 50% goal

129

### Objectives

- **Quantified**
  - To facilitate the evaluation of environmental performance
  - Measurement of progress towards specific environmental targets
- Start with a minimum number of objectives (2-3) and expand over time
- Keep them simple in order to achieve early success
- Can be set organization-wide or specific to an operation

130

### Important lessons

- Post the Os & Ts around the facility
- Score quick wins with Os & Ts to bring about success and show management and employees that the EMS is paying off
- Establish operational controls (work instructions, training, roles/responsibilities, SOPs) for all significant aspects, including those with Os & Ts

131

### Lessons

- Track, review and communicate the status of Os & Ts and EMPs on a regular basis
- Ask for volunteers to own the Os & Ts
- Remember that operations and departments may have different priorities so try and relate to each group when setting goals

132

- Step 1: Determine significant aspects that need Os & Ts
  - Step 2: Identify Os & Ts
  - Step 3: define the performance indicators
  - Step 4: Establish the EMP
  - Step 5: Get top management commitment
  - Step 6: Develop a system procedure
  - Step 7: Check
  - Step 8: Communicate Os & Ts
  - Step 9: Review and revise
- 133

- ### Step 1 Considerations
- Not all significant aspects have to have an objective
  - Evaluate based on
    - LOR
    - Views of interested parties
    - Technical options
    - Financial, operational and other organizational realities
  - Account for existing programs that are working well
  - Be flexible in setting Os & Ts
  - Define a desired result and let employees determine how to achieve results
- 134

- ### Step 2 Considerations
- Consider baseline data or data that can be obtained easily
  - Factors to consider
    - Ability to control
    - Ability to track and/or measure
    - Cost to track measure
    - Links to the environmental policy
  - Focus on areas that will have the greatest impact on environmental footprint
- 135

- ### Step 3 Considerations
- Performance indicators are used to measure performance in meeting Os & Ts
  - May be spelled out for regulatory issues
  - Should be simple, understandable and relevant
  - Need to establish a baseline first
- 136

- ### Examples of performance indicators
- Number of odor complaints per week
  - Pounds of chlorine used per gallon of water treated
  - Energy used per unit of production
  - Percentage of solid waste recycled per used per year
  - Percentage of employees completing environmental training
- 137

- ### Step 4 Considerations
- EMP describes how to achieve Os
  - EMPs directly linked to Os & Ts
  - Step by step action plans
- 138



### EMP tasks

- Establish baselines if not already determined
- List the individual tasks defining what had how to do it
- Assign responsibility for achieving goals
- Establish deadlines for individual tasks
- Estimate staff time and costs

139

- List individual tasks required to meet target
- Assign responsibility for both the entire EMP and the individual tasks
- Plan intermediate deadlines
- Confirm with managers that the resources (both financial and human) are consistent with the approved budget
  - Are there other direct costs
  - Is there equipment needed
  - Are outside services needed

140

### Kent County 2009 Objectives and Targets

| Objective   | Target  | Date              |
|---|---|-------------------|
| Reduce air pollution  | Reduce GHG levels by 25% from CY 2008   | December 31, 2013 |
| Reduce fossil fuel usage                                    | Reduce natural gas usage by 30% from CY 2008 and switch to 25% renewable energy | December 31, 2015 |
| Reduce or eliminate the use of chlorine and SO <sub>2</sub> | Reduce chlorine and SO <sub>2</sub> by 25% from CY 2004 levels                  | December 31, 2010 |

141

### Objective & Targets 2

| Objectives                                   | Target  | Date              |
|--|---|-------------------|
| Remain below Title V threshold               | Reduce NOx by 30% from CY 2008 levels                             | December 31, 2013 |
| Meet publicly acceptable TMDL                | Meet phosphorous and nitrogen levels                              | December 31, 2011 |
| Develop a long range biosolids plan          | Complete pilot study to facilitate a switch from land application | December 31, 2013 |
| Reduce the use of electricity in Admin Bldg. | Reduce electricity usage by 25% from CY 2008 levels               | December 31, 2010 |

142

### Objectives & Targets 3

| Objectives                           | Target   | Date          |
|--------------------------------------|--|---------------|
| Reduce the use of man-made chemicals | Reduce chlorine and sulfur dioxide by 95%, lime by 30%, and ferric chloride in biosolids processing by 90% from CY 2008 levels | Dec. 31, 2015 |
| Improve employee health and safety   | Reduce total recordable incident rate to below 4.0   | Dec. 31, 2013 |

143

### EMPs

|                      |   |                                 |              |            |
|----------------------|---|---------------------------------|--------------|------------|
| Reduce air pollution | Reduce GHG Emissions by 25% from CY 2009 levels |                                 |              | 12/31/2015 |
|                      |   | Develop GHG emission inventory  | Jim Newton   | 12/31/2010 |
|                      |   | Issue GHG report                | Jim Newton   | 1/31/2011  |
|                      |   | Develop GHG reduction strategy  | Jim Newton   | 06/30/2011 |
|                      |   | Develop budget to meet strategy | Hans Medlarz | 12/31/2011 |
|                      |   | Implement GHG strategy          | Keith Powell | 12/31/2015 |

144

|                        |   |   |              |            |
|------------------------|---|---|--------------|------------|
| Reduce fossil fuel use |   |   |              |            |
|                        | Reduce natural gas usage by 30% from CY 2008 levels |   |              | 12/31/2015 |
|                        |   | Install passive solar drying pilot facility | Keith Powell | 12/31/2010 |
|                        |   | Operate passive solar dryers                | Keith Powell | 12/31/2010 |
|                        |   | Design complete system                      | Hans Medlarz | 12/31/2012 |
|                        |   | Install complete passive system             | Keith Powell | 12/31/2015 |

145

|                        |  |                                   |              |            |
|------------------------|--|-----------------------------------|--------------|------------|
| Reduce fossil fuel use |  |                                   |              |            |
|                        | Switch to 25% renewable energy sources |                                   |              | 12/31/2015 |
|                        |  | Design and build 800 kW PV system | Hans Medlarz | 12/31/2010 |
|                        |  | Operate 800 kW PV system          | Keith Powell | 12/31/2010 |
|                        |  | Upgrade PV system to 1.2 mW       | Hans Medlarz | 12/31/2015 |

146

### Avoid

- Making too big a commitment; pick only 1-5 Os & Ts to use an EMP on
- Not communicating the time and resources requirements to upper and lower management
- Not establishing a normalized baseline from which to measure progress

147

### Step 5 Considerations

- Top management needs to ensure that the objectives are integrated with other organizational objectives and mission of the organization
- Inform management of staff, capital and operational costs associated with meeting the objectives

148

### Step 6 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

149

### Step 7 Considerations

- Check:
  - Are there documented Os & Ts?
  - Are the Os & Ts consistent with the environmental policy?
  - Was LOR, significant aspects, technical options, views of internal and external stakeholders, and financial, operational and business realities considered?
  - Were quantifiable performance indicators set?
  - Are environmental improvements noted and tracked?
  - Are programs set to implement Os & Ts?
  - Is progress regularly communicated regarding Os & Ts?

150

### Step 8 Considerations

- Communicate Os & Ts and EMPs to:
  - Employees
  - Suppliers
  - Contractors
  - External stakeholders
- Open communication will improve buy-in, keep the EMS on everyone's radar, and ensure continuous improvement occurs
- Link Os & Ts to employee job activities and on the local community in which they live

151

### Step 9 Considerations

- Fundamental element of EMS is to review, assess and improve
- Revisit EMPs on a regular basis using internal audits, third party audits and management reviews
- Consider any new or modified operations

152

## PHASE III IMPLEMENTATION

153

### Elements

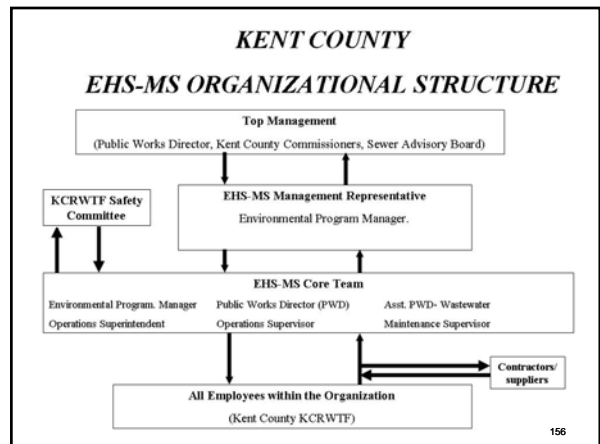
- Roles and responsibilities
- Training, awareness and competency
- Internal and external communication
- EMS document and records
- Operational controls
- Emergency preparedness and response

154

### Roles and responsibilities

- Incorporated into other parts of the EMS

155



### Training, awareness and competency

- Every employee can have potential impacts on the environment
- Any employee can identify positive ways in which to improve environmental management
- Need to verify that everyone has general awareness training about the EMS, the environmental policy and what the EMS means to each employee doing his/her job
- Need to verify that each employee whose job involves a significant aspect is trained and competent to implement procedures and follow regulations to minimize the environmental impact of their jobs

157

- EMS awareness training – training involving an overview of the basics of the EMS, including environmental policy, significant aspects, Os & Ts, and operational controls
- Competency Training – training of employees whose work may create a significant environmental impact and be deemed competent based on education, training or experience.

158

### Assessing training

- What jobs affect the environment?
- What job activities involve a significant aspect?
- What types of training is currently conducted?
- Can EMS roles/responsibilities/controls be included in the training?
- Can the current training material be modified or are new materials needed?
- How are current training record maintained?

159

### EMS training material

- New employee flyer
- Payroll or pay stub inserts
- Training videos
- Green mousepads
- Monthly newsletters
- Posters
- Give aways

160

### When is EMS training needed

- New employee hired
- Employee is transferred to a new job
- Procedures are changed
- New processes, materials or equipment is introduced
- A change in EMS Os & Ts
- New regulations go into effect
- Annual refresher before a 3<sup>rd</sup> party audit

161

### Lessons

- Relate EMS and environmental training to employee work activities
- Create one training plan and program and integrate EMS training into it
- Have division managers present at training sessions to show support for the EMS

162

- Step 1: Assess EMS training needs  
 Step 2: Review and integrate EMS training into current training program  
 Step 3: Conduct, document and maintain EMS training records  
 Step 4: Develop a system procedure  
 Step 5: Check for EMS compliance  
 Step 6: Review and revise

163

## Step 1 Considerations

- Everyone must understand
  - The environmental policy
  - The significant environmental impacts of their work
  - The environmental Os & Ts
  - Key EMS roles and responsibilities
  - Environmental SOPs and work instructions that apply to job functions
  - The importance of following the EMS, environmental requirements and the potential consequences of not doing so

164

## Step 2 Considerations

- Build on what is already in place
- Build on what currently works
- Look at certification training
- Look at current EHS training

165

## Step 3 Considerations

- Need to document and maintain EMS training records
- Need to train all employees on EMS basics
- Need additional training for employees in areas where their jobs have significant environmental impacts in order to help them understand how to minimize the impacts

166

## Step 4 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

167

## Step 5 Considerations

- Check
  - Is there a current process for conducting environmental training?
  - What types of environmental training are currently being conducted?
  - Has EMS awareness training been conducted?
  - Has specific training for employees in significant aspect areas been conducted?
  - How is competence verified?
  - How is training effectiveness evaluated?

168

## Step 6 Considerations

- Review training at least annually
- Review training when new operations, equipment or other processes are implemented
- Revise training when EMS elements change or to accommodate other changes

169

## Lessons

- Identify and document training requirements for each employee
- Get feedback from employees on effectiveness of training materials and adjust based on feedback
- Make the EMS training a part of other training

170

## Avoid

- Making EMS training too technical or reliant on jargon
- Conduct training sessions that are too long
- Having training sessions that preach EMS or environmental requirements

171

## Communication Internal and External

- Internal communication – the flow of information top-down, bottom-up and across the entire EMS fenceline
- External communication – flow of information and soliciting input, receiving inquiries and complaints, responding to and documenting exchanges between parties outside the EMS fenceline

172

## Interested parties

- Individual or group, internal or external to the organization concerned with or affected by the environmental performance of the organization
- Examples:
  - Regulatory agencies
  - Local residents
  - Neighbors
  - Citizen groups
  - Environmental groups
  - Emergency response agencies
  - Advisory groups
  - Contractors and vendors
  - Local and State governmental officials
  - Employees

173

## Communication procedures

- Ensures effective internal communication through the flow of information from the top down, from the bottom up and across the EMS fenceline
- Solicits, receives, documents and responds to external communications
- Considers and records external communications on significant environmental aspects
- Great ideas come from front line employees, ensure a communication mechanism exists to capture these

174

Step 1: Determine what needs to be communicated internally  
 Step 2: Determine currently who external communication is with  
 Step 3: Determine who has an interest and who has a potential effect on the EMS  
 Step 4: Define how the organization can best reach external stakeholders  
 Step 5: Develop a system procedure  
 Step 6: Check for EMS conformance  
 Step 7: Review and revise

175

### Step 1 Considerations

- Look at how information is currently disseminated
- How do managers get information to employees and receive information and communicate back to managers
- How do line managers communicate with one another
- Keep information simple, fresh and to the point

176

### Internally communicate

- Environmental policy
- LORs
- Procedures and work instructions
- Roles & responsibilities
- Significant aspects
- Os & Ts
- EMP tasks
- EMS progress and success stories
- EMS audit results

177

### Internal communication vehicles

- Employee meetings
- EHS training
- Working lunches
- Newsletters
- Pay stubs
- Intranet
- Bulletin boards
- Give aways

178

### Step 2 Considerations

- Make a strong effort to reach out to external stakeholders
- Consult with key stakeholders why an EMS is being implemented and what is expected from it
- Keep key stakeholders abreast of progress as the EMS is developed and how it is performing once in place

179

### Externally communicate

- Environmental policy
- Significant aspects
- Os & Ts
- Requirements of suppliers and contractors wrt the EMS
- Annual reports
- EMS highlights and success stories

180

### Step 3 Considerations

- Determine who potentially has an interest in the EMS
- Determine who has an effect on the EMS

181

### Questions to ask

- What is the current level of public acceptance?
- What are the external stakeholders?
- Has the facility had public relations issues in the past that require certain strategies or cautions?
- What type of input from external stakeholders would interest the facility and be most useful?
- What will be the return on investment for a proactive approach?

182

### Step 4 Considerations

- How to best reach the external stakeholders
- External communication vehicles
  - Annual reports
  - Steering committees and/or advisory groups
  - Media releases
  - Open houses and tours
  - Websites
  - Surveys
  - Mailings
  - Newsletters

183

### Step 5 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

184

### Step 6 Considerations

- Check:
  - Who are the key interested parties and how were they identified?
  - What are the key concerns of the interested parties?
  - Do employees know their roles and responsibilities for ensuring communication?
  - Are employees aware of procedures and operational changes that affect their daily activities?
  - Can employees relate how their job functions connect to the EMS?  
Can employees who need the necessary information have access to it?
  - What processes are used to respond to internal inquiries, concerns and suggestions?
  - Have EMS requirements been communicated and understood by the employees and contractors?

185

### Step 7 Considerations

- Review the communication procedure and what is communicated and revise as necessary
- Ensure new operations and procedures are included
- Review at least annually as a part of the management review

186



### Lessons

- Communicate EMS information up, down and across the organization
- Keep internal messages simple, clear, concise, and fresh
- Proactive, two way communication with external parties is important

187

### Avoid

- Starting the EMS communication plans and procedures from scratch, build on existing communication methods
- Not communicating frequently on the EMS progress
- Not identifying and communicating with key external stakeholders and seeking their input

188

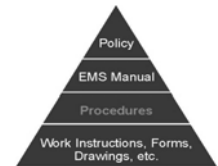
### Keys to success

- Try using creative methods to communicate the EMS message
- In communicating with employees, explain not only what they need to do, but also why they need to do it
- Get the word out on the EMS. Communicate with internal and external stakeholders in order to obtain buy-in and maintaining external stakeholder support

189

### EMS documents and records

- Written procedures, policies, work instructions, manuals, etc,
- Document hierarchy



190

### Definitions

- Controlled documents – Policies, procedures, manuals and other documents that are a part of the EMS and need to be controlled and are maintained. Its one that is reviewed for relevance on a regular schedule to ensure the most current version is used in the field
- Work instruction – documented work tasks that provide a detailed understanding of how specific work processes are accomplished.

191

### EMS documents

- Describe EMS daily tasks
- Describe how EMS tasks are accomplished
- Ensures activities and operations are consistent

192

### EMS records

- Present objective evidence that EMS procedures are being followed
- Examples
  - Training records
  - Audit checklists
  - List of significant aspects
  - Management review meeting notes

193

### EMS system procedures

- Required
  - Environmental aspects
  - LORs
  - Communication
  - Document Control
  - Operational Control
  - Emergency Response
  - Nonconformance and Corrective Actions
  - Records
- Optional
  - Os & Ts
  - EMPs
  - Management review

194

### Other EMS documents

- Maintenance manuals
- Work Instructions
- Contractor contact information
- Contracts
- Permits and related guidance materials

195

### EMS records

- Training records
- Delivery logs/bills
- Calibration results
- Audit reports and checklists
- List of significant aspects
- Management review
- Meeting notes

196

- Step 1: Assess EMS document control and record requirements
- Step 2: Review current document control and records procedure
- Step 3: Develop a system procedure
- Step 4: Check for EMS conformance
- Step 5: Review and revise

197

### Step 1 Considerations

- Developed as a part of the EMS process
  - Initially time consuming
- Once developed, need to review and revise as necessary
- EMS records are a direct result of the EMS procedures and activities
- Records should be
  - Traceable to and identified with an activity or operation
  - Maintained for review
  - Disposed of if no longer applicable

198

## Step 2 Considerations

- Will a paper or electronic process work best?
- Who has the responsibility and authority for creating and revising documents?
- Which documents should be controlled and how can the current versions be made available?
- Does the organization currently employ a standard document format and numbering system?
- Does the current system meet EMS requirements?

199

## Step 3 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

200

## Step 4 Considerations

- Check
  - Document control
    - Are the document control and record management procedures being followed?
    - How are current versions of documents and procedures verified and being used?
    - Are the documents legible and dated?
    - Is there a process to remove obsolete documents?

201

- Record management
  - Have EMS records that need to be maintained been identified?
  - Have record retention time periods been established?
  - How are the records stored and retrieved?
  - Are all records required by the EMS being maintained?
  - Are all records easily accessed?

202

## Step 5 Considerations

- Review and revise as necessary
- Make any changes needed due to new or changed operations, etc.
- Review the need for new documents and records during the management review meetings

203

## EMS Manual

- Required by ISO 14001
- Describes the basics of the EMS' 17 core elements
- Provides a description of where related documents can be found
- Roadmap of how the pieces of the EMS fit together and the 17 elements of the EMS
- Kent County: [www.co.kent.de.us](http://www.co.kent.de.us); public works page then environmental management system page

204

### Lessons

- Develop a document management system early in the EMS implementation process
- Create a file folder on the Intranet site to house and control the most current versions of the EMS documents
- Establish a records retention policy and stick to it

205

### Avoid

- Creating an EMS manual that is too long; limit it to ½ to 1 page per EMS system element.
- Not establishing clear procedures on who can generate, and make changes to the EMS documents
- Collecting and maintaining EMS records that do not add value

206

### Keys to success

- Prepare a document control index that shows all of the EMS documents and their revision history
- Consider using an electronic EMS document and records management system
- Clearly explain the difference between EMS documents and records and how they are managed

207

### Operational control

- Operational controls – Documents and other mechanisms that specify the way to execute a certain activity or operation. Operational controls are assigned to operations and services involving significant aspects and are documented through the use of work instructions, procedures, manuals, training and other programs

208

### Purpose

- Managing or controlling the facility's environmental impacts, in particular, operations and services from which the significant environmental impacts, Os & Ts and regulatory requirements are derived
- One of the most difficult elements to understand

209

- Step 1: Identify significant environmental operations
- Step 2: Review and draft operational controls
- Step 3: Review maintenance and calibration requirements
- Step 4: Check for EMS conformance
- Step 5: Communicate operational controls
- Step 6: Review and revise

210

### Step 1 Considerations

- Determine which operations should be covered
- Determine how to control them
- Might need operational controls to manage significant aspects and LORs, whether they are subject to Os & Ts or not

211

### Step 2 Considerations

- Look at what is already in place
- Do current procedures reflect what is actually done?
- Reference and document existing op controls in EMS Manual

212

### Step 3 Considerations

- Maintenance and calibration of equipment in areas that could have significant environmental impacts
- Might want to place calibration of some equipment under a special program

213

### Step 4 Considerations

- Check:
  - Have all operations and activities associated with significant environmental impacts, legal requirements and environmental Os & Ts been identified?
  - Are these operations and activities under control through programs, documented procedures, work instructions , training, competency?
  - Have employees, suppliers, vendors, contractors been trained on applicable procedures, work instructions, etc.?

214

### Step 5 Considerations

- Review documented procedures and work instruction with all employees
- Communicate with the people who will need to implement them and secure their input
- Communicate with applicable vendors, suppliers, contractors and temporary staff

215

### Step 6 Considerations

- Review operational controls when operations change or new operations and procedures are instituted
- Review at least annually

216

## Lessons

- The most effective operational controls are short and simple
- In determining which operations and activities need to be controlled, look beyond operations and services to equipment maintenance, management of on-site contractors, and services provided by vendors and suppliers
- Use photos and diagrams where applicable as operational controls

217

## Avoid

- Not including suppliers and contractors that provide operations, goods, and services that have a direct impact on the facility's significant aspects and Os & Ts
- Starting from scratch when developing operational controls
- Overlooking the maintenance and calibration of equipment for significant environmental aspect areas and Os & Ts

218

## Keys to success

- Check in with all shifts and satellite offices for improvement suggestions, to test procedures and to get involvement and buy-in to the EMS
- Keep the language clear and simple
- Start by looking at the significant environmental aspects and LORs that were identified during the planning phase

219

## Emergency preparedness and response

- Accidents and emergency situations can and do occur
- Many local utilities now required to conduct vulnerability assessments
- Ensure that effective plans for preparing for and responding to emergencies are available, easily accessible and clearly understood by everyone needing them

220

- Emergency response is integrated into everyday operations, activities and services
- Guides an organization to continuously improve the management of risks and threats over a short term and long term basis
- Ultimate goal is to protect employees and the community, to prevent and minimize environmental impacts, and to reduce operational damage
- Does not require any new emergency plans to be developed, just integrate all current ones

221

## Establish and implement procedures

- Identify the potential for and response to accidents and emergency situations
- Prevents and mitigates the environmental impacts that may be associated with an emergency
- Review and revise emergency preparedness and response procedures after the occurrence of accidents and emergency situations
- Periodically test such procedures

222

- Step 1: Identify existing emergency plans and/or procedures
- Step 2: Identify potential accident and emergency scenarios
- Step 3: Define how the organization can prevent emergency incidents and mitigate impacts
- Step 4: Develop a system procedure
- Step 5: Check for EMS conformance
- Step 6: Review and revise

223

## Step 1 Considerations

- Most organizations have multiple emergency response plans
- These might include:
  - SPCC plans
  - RCRA contingency plans
  - OSHA emergency plans
  - PSM emergency plans
  - HAZWOPER plans

224

## Consider

- Are the plans current?
- Have contact information or telephone numbers changed?
- When was the last time the plans were tested?
- Is training adequate and up to date?
- Are new and temp employees being trained?
- Are there gaps between what is in place and what the EMS requires?
- Are contractors, vendors and suppliers trained if needed?

225

## Step 2 Considerations

- Brainstorm potential emergency situations from everyday activities
- Consider potential risks from accidents and/or hostile acts
- Remember response plans may overlap for a variety of emergency situations
- Communicate with local officials about the potential emergencies at the facility

226

## Step 3 Considerations

- Do not overlook or forget accident prevention
- Look for ways to prevent environmental accidents

227

## Lessons

- Be very clear on staff roles and responsibilities related to emergency prevention and response
- Be specific about who in the organization will conduct emergency response training and when it will be conducted
- Post copies of the emergency plans around the facility, especially in areas where potential hazards exist

228

### Avoid

- Not inviting local emergency response agencies into the facility for emergency reviews and drills
- Thinking only about response – focus on how to prevent accidents and emergencies
- Starting the emergency preparedness and response procedures/plans from scratch

229

### Keys to success

- Establish the effectiveness of the emergency response plans on a regular basis (at least annually) by conducting drills and assessments
- Make emergency response plans available, easily accessible and clearly understood by everyone who might need them
- Evaluate the effectiveness of the emergency response procedures/plans and vulnerability assessments on a regular basis (at least annually)

230

### Step 4 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

231

### Step 5 Considerations

- Check
  - Have environmental operations and activities been reviewed for potential emergency situations?
  - Are personnel trained and aware of the roles and responsibilities during an emergency?
  - Are emergency drills conducted and the results documented?

232

### Step 6 Considerations

- Review and revise as necessary
- Make any changes needed due to new or changed operations, etc.
- Review the need for new documents and records during the management review meetings

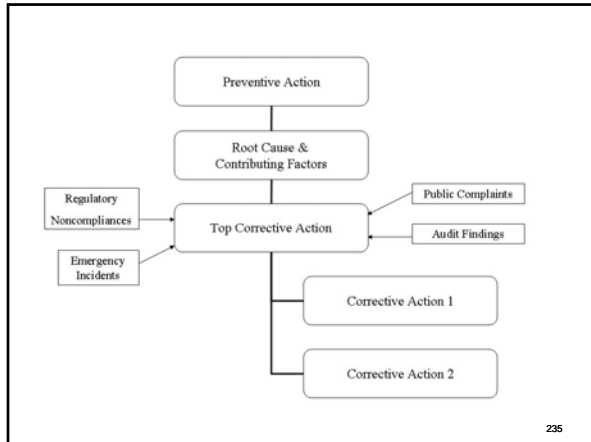
233

### Phase 4

### Checking and Corrective Action

234





235

### Activities

- Monitoring and measuring
- EMS internal/external auditing
- Nonconformance & corrective/preventive action

236

### Monitoring/measuring

- Allows the organization to track environmental performance and improve efficiency by managing what is done
- Can't manage what can't measure
- Easier to demonstrate Os & Ts when current and reliable data are available and referenced against a baseline

237

### Monitoring/measuring

- Identify key characteristics of operations and activities that can have a significant impact
- Track performance
- Monitor conformance with operational controls
- Calibrate and maintain monitoring equipment
- Periodically evaluate compliance with LORs

238

- Step 1: Determine what is currently monitored and measured
- Step 2: Identify what needs to be monitored and measured
- Step 3: Assess compliance and track environmental performance
- Step 4: Develop a system procedure
- Step 5: Check for EMS conformance
- Step 6: Communicate progress and performance
- Step 7: Review and revise

239

### Step 1 Considerations

- Examine operations and services and determine what is currently measured
- Start with environmental regulations
- How well do these current measurements meet the EMS program requirements?
- Are there additional monitoring/measuring requirements?

240

## Step 2 Considerations

- Currently track data on a continuing basis
- Needed to determine whether and how the facility is achieving its Os & Ts and to properly manage the significant aspects
- Is the EMS being carried out as planned?
- Is the organization meeting its Os & Ts?
- Select a combination of process and outcome measures

241

## Step 3 Considerations

- Use the compliance assessment to determine if the organization is well suited to address instances of noncompliance
- Determine root causes of any noncompliances (keep causes to no more than 6-8)
- Have regular checks on the progress of Os & Ts and report results to top management
- Assess and track significant aspects

242

## Step 4 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

243

## Step 5 Considerations

- Check
  - Have operations and activities associated with significant environmental aspects, LORs and Os & Ts been identified?
  - Has the status of legal compliance been completed?
  - Have what needs to be monitored been identified?
  - Have what performance indicators/metrics been identified?
  - Has a schedule for monitoring/measuring been established?
  - Have equipment needs that need to be maintained and calibrated been identified?
  - Are performance information communicated to management on a regular basis?

244

## Step 6 Considerations

- Communicate and report progress to top management and staff
- Management needs to know if resources are appropriate and properly allocated
- Employees respond to information that is meaningful to them

245

## Step 7 Considerations

- Review and revise as necessary
- Make any changes needed due to new or changed operations, etc.
- Review the need for new documents and records during the management review meetings

246

### Calibration

- Need to document calibration requirements and dates for equipment used in areas where significant aspects, Os & Ts and LORs have been established
- Make sure a regular schedule is in place for calibration
- Some equipment may need to be calibrated off site

247

### Lessons

- Start with a relatively simple monitoring and measuring process, looking at LORs and significant aspects
- Select performance indicators that will provide the information needed to make effective decisions about the EMS
- Don't forget about on site and off site contractors that calibrate and/or maintain equipment that is within identified significant operations and services

248

### Avoid

- Going out of the way to monitor and measure everything
- Not committing the necessary resources (human and dollars) to track performance information over time
- Not communicating the performance and progress of the Os & Ts to management and staff

249

### Keys to success

- Evaluate the information that is collected for value
- Include top management and other decision makers in setting up what is to be monitored and measured
- Remember the external stakeholders when determining what to monitor and measure

250

### EMS auditing

- Types
  - Internal
  - 3<sup>rd</sup> party external
- Used to verify EMS effectiveness
- Snapshot in time
- Documented review of whether the organization is doing what it said it would do to manage its environmental issues and how effectively it is doing it
- Not a compliance audit or assessment

251

### Definitions

- Finding – A discovery of the lack of conformance to the requirements of EMS criteria/checklist. All findings must be resolved
- Major nonconformance – A deficiency in meeting the requirements of an EMS in which one or more of the 17 elements of the ISO 14001 standard has not been addressed or implemented

252

- Minor nonconformance – A finding that leads to a failure to conform completely with an EMS element, but is not considered to be a breakdown in the system. Too many minor nonconformances in one area could be considered a major nonconformance
- Observation – A recognition of something done incorrectly or an area of concern. It is not a nonconformance but if done could strengthen the EMS or if done incorrectly could result in a system failure

253

### Auditor credentials

- Independent of areas being audited
- Have an understanding of relevant laws and regulations
- Receive EMS training
- An understanding of the audit process and procedures
- Good communication skills
- An attention to detail
- Good writing skills

254

Step 1: Select and train EMS internal auditors

Step 2: Determine the EMS audit scope and frequency

Step 3: Prepare staff for the audit

Step 4: Conduct the desktop review

Step 5: Conduct the audit

Step 6: Develop a system procedure

Step 7: Check for EMS conformance

Step 8: Review and revise

255

### Step 1 Considerations

- Your own qualified and trained personnel are best to conduct an internal audit
- Train at least two employees as internal auditors
- Auditors should be objective and should not audit his/her own area of operation or service

256

### Step 2 Considerations

- Determine how often to audit and the scope of the audit
- May want to break the scope down to specific operating areas
- Typically want to conduct an annual audit of the entire fence line
- Consider the environmental importance of the activities and results of prior audits

257

### Step 3 Considerations

- Lead auditor prepares audit plan
  - Statement of audit objectives
  - Identification of the elements being audited
  - Review of any special emphasis or focus
  - References to appropriate plans, procedures or requirements documents
  - Timetable for the audit
  - Identification of the audit team and their roles
  - Audit materials such as checklists, questionnaires, etc.

258

### Prepare management in advance

- Their EMS responsibilities
- Rehearsing the types of questions to be asked
- Organizing and tracking corrective actions that the audit identifies
- Indicating suggested times for the pre-audit meeting to review the audit scope, plan and schedule, and the closing meeting
- Encouraging management to be visible, involved and available while the audit is being prepared

259

### Prepare employees

- Emphasizing the opportunities the audit provides
- Reviewing the environmental policy and confirming the role it has in employees' daily activities
- Reviewing significant aspects, Os & Ts with relevant department managers and front line employees
- Rehearsing the types of questions the auditor might ask
- Reviewing EMS roles and responsibilities

260

### Prepare documents/records

- Ensure documents and records are
  - Current
  - Easily retrievable
  - Controlled according to the document control procedures

261

### Step 4 Considerations

- Review the written EMS
  - Policies
  - Procedures
  - Records
- Conducted to provide the audit team with a snapshot overview of the organization's EMS elements and how they fit together
- First look at how the EMS and its system elements fit in with the current environmental programs

262

### Step 5 Considerations

- Hold an opening meeting
- Audit the system for EMS conformance
- Report the EMS audit findings

263

### Opening meeting

- Conducted before the audit with management and relevant staff
- At the meeting
  - Introduce audit team members and the leader
  - Review the audit scope
  - Review checklists/questionnaires to be used
  - Review the audit schedule

264

## Conduct the audit

- Tour the site and observe operations and services within the fence line
- Review work practices and operations
- Interview employees
- Examine procedures, documents and records
- Ensure all EMS elements covered in the scope are covered and reviewed
- Take notes, make observations, document findings and write up findings of nonconformance

265

## Report findings

- Report findings as:
  - Observations
  - Minor nonconformances
  - Major nonconformances
- Present preliminary findings during a closing meeting
- Allow facility to correct any misunderstandings before completing a final report
- Lead auditor prepares final report

266

## Step 6 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

267

## Step 7 Considerations

- Check:
  - Has the organization determined who will conduct the EMS internal audit?
  - Are they qualified and trained?
  - Is there an EMS audit program that verifies the conformance of the EMS?
  - Are EMS findings of nonconformance documented? Are corrective and preventive actions implemented for audit findings of past nonconformances?
  - Are audit checklists and reports maintained as EMS records?
  - Are audit results communicated to management?

268

## Step 8 Considerations

- Review and revise as necessary
- Make any changes needed due to new or changed operations, etc.
- Review the need for new documents and records during the management review meetings

269

## Lessons

- Make a cheat sheet for employees covering Os & Ts, significant aspects and environmental policy
- Work with the staff's schedule to avoid a disruption in routine or daily operations
- Establish a well defined audit schedule and plan

270

### Avoid

- Trying to be too textbook and/or using too much EMS jargon during the audit
- Not providing the necessary training for the internal auditors
- Not preparing staff for the EMS audit

271

### Keys to success

- Streamline the EMS internal auditing process to be understandable to employees
- Perform an internal audit of the EMS system and processes – not individuals
- Make the EMS internal audit process a positive experience, identify strengths as well as weaknesses and opportunities for improvement

272

### Nonconformances and corrective and preventive actions

- Nonconformances may be uncovered during an audit or observed by employees
- Nonconformances describe one or more EMS requirements that have not been addressed or implemented
- Nonconformances must be corrected within a given timeframe

273

- Step 1: Identify EMS nonconformances
- Step 2: Identify root causes and prevent their reoccurrence
- Step 3: Implement corrective and preventive actions
- Step 4: Update and communicate EMS corrective and preventive actions
- Step 5: Develop a system procedure
- Step 6: Check for EMS conformance
- Step 7: Review and revise

274

### Step 1 Considerations

- Nonconformances can be identified
  - Through audit findings
  - As employee suggestions
  - By monitoring significant environmental issues
- To manage nonconformances
  - Identify and investigate EMS deficiencies
  - Determine root causes
  - Implement corrective and preventive actions
  - Manage corrective and preventive actions (CPAs)
  - Verify the effectiveness of CPAs

275

### Step 2 Considerations

- Look beneath the surface to determine why the nonconformance occurred in the first place

276

### Typical causes of nonconformances

- Poor communication
- Faulty or missing procedures
  - Outdated procedures
  - Document control
- Equipment malfunction (or lack of maintenance)
- Lack of training
  - Lack of understanding of an EMS requirement
  - Not following an EMS requirements
- Act of God

277

### Step 3 Considerations

- Corrective action is designed to prevent and manage any nonconformance
- Use a corrective action report (CAR)
- A CAR
  - Identifies and describes the nonconformance
  - Identifies the action items needed to implement the correction
  - Identifies the person(s) responsible for implementing and tracking the correction
  - Identified the timeframe for completion
  - Verifies the effectiveness of the corrective actions

278

### Step 4 Considerations

- Update and communicate
- May need to update, train and communicate revised procedures and work instructions
- May need to establish new programs
- May need to calibrate equipment
- Inform management in order to allow the EMS improvements to become a part of the day to day operations
- Don't need to fully document as nonconformances smaller issues
- Completed CARs are EMS records and need to be traceable to an operation or activity and maintained for review
- Following audits should evaluate the nonconformances and corrective actions

279

### Step 5 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

280

### Step 6 Considerations

- Check:
  - Is there a procedure for identifying, managing, tracking and closing EMS nonconformances?
  - Does the process include identifying the root cause and assigning responsibilities and timeframe for completing the corrective actions?
  - Are corrective actions documented and recorded?
  - Is there a procedure for preventing the reoccurrence of nonconformances?

281

### Step 7 Considerations

- Review and revise as necessary
- Make any changes needed due to new or changed operations, etc.
- Review the need for new documents and records during the management review meetings

282



### Lessons

- Corrective actions should be based on good information and the analysis of root cause
- Designate employees from the areas where the nonconformances occurred as responsible for implementing corrective and preventive actions
- Review the EMS progress regularly and follow up to ensure that corrective actions are effective

283

### Avoid

- Starting from scratch if the organization has other management systems in place, such as ISO 9001
- Not documenting and resolving the nonconformances in a timely manner
- Not documenting EMS activities that are going well; document EMS successes

284

### Keys to success

- Focus on correcting and preventing problems
- EMS nonconformances should be analyzed to detect patterns or trends
- Be sure that the corrective and preventive action process specifies roles and responsibilities and schedules for completion

285

## Phase V

### Management Review

286

### Management review

- Management review
- Organizational goal assessment
- Continual improvement

287

- Assess EMS performance
- Judge the suitability, adequacy and effectiveness of the EMS
- Consider new organizational goals
- Top management reviews and fine tunes the EMS
- Top management determines
  - Whether the EMS is functioning as intended
  - Where resources may need to be allocated
  - If the environmental policy is appropriate or needs to be revised
  - If the Os & Ts are on track

288

- Step 1: Determine when and what to review
- Step 2: Identify who should attend the management review
- Step 3: Document accomplishments and follow up actions
- Step 4: Develop and systems procedure
- Step 5: Check for EMS conformance
- Step 6: Review and revise

289

## Step 1 Considerations

- Schedule at appropriate intervals
  - After internal/external audits
  - To check on the progress of Os & Ts
  - At least annually
  - Best for the organization

290

## What to review

- Decide with the Core Team
- Present the information that is easily understood
- Use objective information from audits
- Focus on performance and not process or procedures
- EMS should collect the information

291

## Questions to consider

- Did we achieve our Os & Ts? If not, why not?
- Is our environmental policy still relevant to what we do?
- Are we applying resources effectively?
- Are our procedures clear and adequate? Do we need other controls or to modify any?
- Are we monitoring our EMS?
- What do the results of the audits reveal?
- What other changes are coming? What impacts will these have on the EMS?
- What stakeholder concerns have been raised since the last review?
- How are stakeholder concerns being addressed?

292

## Information to cover

- Audit results
- External communications
- Progress on Os & Ts
- Progress towards or achievement of environmental performance measures
- Reports of emergencies, spills or other incidents
- Status of corrective actions
- Results of action items from previous meetings
- Policy revisions based on EMS effectiveness and suitability
- Changing circumstances (management of change)

293

## Step 2 Considerations

- Include people
  - Who have the right kind of information and knowledge
  - Who can make decisions about the organization and its resources

294

### Step 3 Considerations

- Track and document EMS performance
- Someone should document and record
  - The issues discussed
  - Decisions reached
  - Follow up action items and responsibilities

295

### Step 4 Considerations

- Document the process in a system procedure
- Guides future generations to understand what was done and to duplicate the procedure (though not necessarily the outcomes)
- Procedure should
  - What steps to take
  - Roles and responsibilities
  - When to conduct specific tasks
  - Methods of communicating
  - Where the information will be stored

296

### Step 5 Considerations

- Check:
  - Are management reviews scheduled on a regular (at least annual) basis?
  - Does the management review check for the effectiveness of the EMS based on policy, Os & Ts, previous audits, changes to operations, etc.?
  - Are management reviews documented and recorded?
  - Are action items tracked?

297

### Step 6 Considerations

- Review and revise as necessary
- Make any changes needed due to new or changed operations, etc.
- Review the need for new documents and records during the management review meetings

298

### Lessons

- Communicate and review with top management to find out what they would like to see in order to assess the EMS
- Provide top management with just a summary of the EMS
- Ensure that all levels of management participate in the review

299

### Avoid

- Not communicating with top management on what they would like to review to assess the performance of the EMS
- Conducting only an annual review; consider quarterly reviews
- Not training top management on the fundamentals of the EMS

300

## Keys to success

- Top management must receive frequent updates, especially wrt the status and performance of the EMS
- Management reviews should assess how changing circumstances might influence the suitability, effectiveness or adequacy of the EMS
- Consider other organizational plans and goals when assessing potential changes to the EMS

301

## 3<sup>rd</sup> Party Audits

- Seeking certification of the EMS
- Looks for system elements and linkages
- Based on verifying that the 17 ISO 14001 elements are institutionalized
- Focuses on employee interviews and document reviews

302

## Benefits

- Internal
  - Assures that the EMS elements are in place and working as expected
  - Protects the investment in the EMS
  - Keeps management and staff attention on the EMS
- External
  - Provides credibility and commitment to external stakeholders
  - Improves relationship with regulators
  - Supports federal and state EMS incentive programs

303

- Step 1: Select a registrar
- Step 2: Prepare staff for registration audit
- Step 3: Have an EMS desktop review conducted
- Step 4: Support the EMS registration audit
- Step 5: Follow up on the EMS registration audit

304

## Step 1 Considerations

- Registrar selection criteria
  - Public, utility chemical and wastewater sector experience
  - Comfort with the auditor: personality of the auditor relating to staff, and vice versa
  - Good price for services received
  - Knowledge of how public entities and other organizations are set up and operate
  - Added value expected from the registrar through the registration process
  - Technical and auditing expertise of the registrar staff

305

## Step 2 Considerations

- Well in advance of audit prepare management by
  - Reviewing EMS responsibilities
  - Rehearsing the type of questions that the auditor might ask
  - Preparing staff to organize and track corrective actions that the audit identifies
  - Indicating on managers' calendars suggested times for the pre-audit meeting, and closing meeting
  - Encouraging them to be visible, involved and available preceding the audit
  - Freeing up the EMR to accompany the auditors

306

- Well in advance of audit prepare staff by
  - Emphasizing the find, fix and prevent opportunity the audit provides
  - Reviewing the environmental policy and confirming the role it has in employee’s daily activities
  - Reviewing significant aspects, and Os & Ts with relevant department managers and the front line employees
  - Rehearsing the type of questions the auditor might ask
  - Reviewing the EMS roles and responsibilities

307

- Well in advance of audit prepare documents and records by
  - Ensuring they are current, easily retrievable and managed according to the document control procedure

308

- ### Step 3 Considerations
- Third party off site review of
    - EMS policies
    - EMS procedures
    - EMS records
  - Some auditors prefer this before the on site audit, others as a part of the on site audit

309

- ### Step 4 Considerations
- Provide facilities for the audit team to be effective and efficient
  - Provide access to on site areas and systems to interview personnel and retrieve documents and records
  - Cooperate with the audit team to ensure the audit objectives are achieved

310

- ### Step 5 Considerations
- Recommendations form the audit
    - Registration
    - Registration after corrective actions of major nonconformances
    - Onsite reaudit

311

### Timeline

|  |            |
|--|------------|
| Develop and solicit RFP or RFQ                       | 1-2 months |
| Interview, negotiate and select registration company | 1 month    |
| Arrange audit schedule                               | 1 month    |
| Desktop audit  | 1 month    |
| Registration audit                                   | 3-5 days   |

312

### Typical audit

- Costs - \$7,000 - \$30,000
- Team composition - 1-2
- Audit length - 2-5 days
- Note: registration is every 3 years

313

### Lessons

- Don't be afraid to disagree with the auditor and stand up for your program. It is your program
- Contact other organizations that have been successful in passing their third party registration audit
- Keep it simple
- Only have one current procedure available for what you do
- When the third party auditors come out to review your EMS, make sure to stress to employees that they are not being audited, only the system is

314

### Avoid

- Scheduling audits with major commitments just prior to or after the audit
- Unnecessary interruptions during the registration audit
- Selecting the registrars with no technical or industry experience
- Being unprepared

315

### Keys to success

- Be flexible
- Prepare Top Management, the Steering Committee, Core Team, Department Supervisors and frontline staff
- Make cheat sheets for the employees
- Look for ISO 14001 auditors with industry experience
- Look for registrars that have a Board of Directors and a mechanism to give feedback on their auditing

316

### Beginning EMS characteristics

- 0-2 years in existence
- Goals
  - Developing EMS
  - Completing initial 3<sup>rd</sup> party audit
- Activities
  - Strengthening compliance
  - Understand ISO 14001 requirements
  - Learning how to communicate the EMS
  - Building foundation policies, procedures, etc
- Characteristics
  - Energy/resource intensive
  - Management provides resources but involvement may be limited
  - Use available or very simple metrics to measure EMS performance

317

### Deploying EMS characteristics

- 2-5 years
- Goals
  - Strengthen linkages among EMS elements
  - Demonstrate the performance and benefits of the EMS
- Activities
  - Use EMS to integrate and align existing programs and systems
  - Continue to develop and enhance metrics for EMS
- Characteristics
  - CAPA processes in development
  - EMS is still being refined
  - Focus is still on the present, nit the future
  - EMS is becoming a part of the business process
  - Cultural change starting
  - Management understanding and use of the EMS in key decisions

318

### Maturing EMS characteristics

- 5+ years
- Goals
  - Continue to define and meet stakeholder needs
  - Achieve/maintain high level of environmental performance and demonstrate real business value
- Activities
  - Improve efficiency through process improvement
  - Include EMS and other environmental data in strategic planning process
  - Tracking of nonconformances with emphasis on prevention
  - Corrective/preventive action process is well established

319

- Characteristics
  - High level of management involvement
  - EMS serves as a launch pad for new environmental initiatives
  - Use of environmental metrics is well established
  - Linkages within the EMS and with other management systems are well established and understood
  - Cultural change continues as the EMS becomes the way the organization does business

320

|                | Policy | Legal & Other | Significant Aspects & Risks | Objectives & Targets | Management Plan |
|----------------|--------|---------------|-----------------------------|----------------------|-----------------|
| ISO 14001      | Y      | Y             | Y                           | Y                    | Y               |
| NBP            | Y      | Y             | Y                           | Y                    | Y               |
| OHSAS 18001    | Y      | Y             | Y                           | Y                    | Y               |
| ISO 9001       | Y      | Y             | Y                           | Y                    | Y               |
| Energy         | Y      |               | Y                           | Y                    | Y               |
| Sustainability | Y      |               | Y                           | Y                    | Y               |
| CMOM           | Y      | Y             | Y                           | Y                    | Y               |
| Asset Mgt.     | Y      |               | Y                           | Y                    | Y               |

321

|                | Structure and Responsibility | Training, Awareness, Competency | Communication | Operational Controls | Emergency |
|----------------|------------------------------|---------------------------------|---------------|----------------------|-----------|
| ISO 14001      | Y                            | Y                               | Y             | Y                    | Y         |
| NBP            | Y                            | Y                               | Y             | Y                    | Y         |
| OHSAS 18001    | Y                            | Y                               | Y             | Y                    | Y         |
| ISO 9001       | Y                            | Y                               | Y             | Y                    | Y         |
| Energy         | Y                            |                                 | Y             | Y                    | Y         |
| Sustainability | Y                            |                                 | Y             | Y                    | Y         |
| CMOM           |                              | Y                               | Y             | Y                    | Y         |
| Asset Mgt.     |                              |                                 | Y             |                      |           |

322

|                | Document control | Mgt. System Documents | Monitoring Measuring | Non-conformance | Internal audits |
|----------------|------------------|-----------------------|----------------------|-----------------|-----------------|
| ISO 14001      | Y                | Y                     | Y                    | Y               | Y               |
| NBP            | Y                |                       | Y                    | Y               | Y               |
| OHSAS 18001    | Y                | Y                     | Y                    | Y               | Y               |
| ISO 9001       | Y                | Y                     | Y                    | Y               | Y               |
| Energy         | Y                |                       | Y                    | Y               | Y               |
| Sustainability | Y                |                       | Y                    | Y               | Y               |
| CMOM           | Y                |                       | Y                    | Y               | Y               |
| Asset Mgt.     | Y                |                       | Y                    | Y               | Y               |

323

|                | Records | Management Review | Public Participation |
|----------------|---------|-------------------|----------------------|
| ISO 14001      | Y       | Y                 |                      |
| NBP            | Y       | Y                 | Y                    |
| OHSAS 18001    | Y       | Y                 |                      |
| ISO 9001       | Y       | Y                 |                      |
| Energy         | Y       | Y                 |                      |
| Sustainability | Y       | Y                 |                      |
| CMOM           | Y       |                   |                      |
| Asset Mgt.     | Y       |                   |                      |

- END -

324