EUROPEAN COMMISSION
EURO-MEDITERRANEAN PARTNERSHIP

Development of Tools and Guidelines for the Promotion of the Sustainable Urban Wastewater Treatment and Reuse in the Agricultural Production in the Mediterranean Countries

(MEDAWARE)

Task 6: Development of a Methodology and a Database for the Control and Monitoring of the Urban Wastewater Treatment Plants

Subtask 6.1: Development of a methodology for the dynamic control and monitoring of the wastewater treatment plants:

- **Development of guidelines for setting and regular review of internal targets or programs for continuous environmental improvement.**

PART I, "Application of the ISO 14001 and EMAS to the operation processes of a WWTP to assure the regular operation"

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1 INTRODUCTION

Environmental Management refers to all actions that contribute to:

- Fulfil the environmental legislation requirements.
- Improve the environmental protection.
- Reduce the impacts of the organization on the Environment, to control the processes and activities that generate them.

All these actions planned and organized inside an organization, will conform the "Environmental Management System" (EMS) that provides a structured methodology directed to the **"Continuous Environmental Improvement"**.

The main purpose of an EMS is to determine what elements the organizations should consider in matter of environmental protection to assure that, in the development of its activities, keep in mind the prevention and the minimization of the effects on the environment. They are based on the idea to integrate actions of environmental protection in a solid organized structure, that guarantees the control of the activities and operations that could to generate Significant Environmental Impacts.

Therefore, an EMS is appropriate for all kinds of organizations of different sizes in both, public and private sectors, because an EMS is a structured Management System that includes the organizing structure, the planning of the activities, the responsibilities, the practices, the processes, the procedures and the resources to develop, to establish, to carry effect, to revise and to keep up to date the commitments in matter of environmental protection that subscribes the organization, that is to say, its Environmental Policy.

KEYPOINTS:

An EMS:

- Defines the critical management elements and Operational Control that must be in place and followed to control the Environmental Impact.
- An EMS includes:
    - Defining roles and responsibilities.

  - Identifying and prioritizing Environmental Aspects & Impacts.
  - Setting measurable Objectives & Targets.
  - Verifying and establishing Operational Control.
  - Monitoring and measuring activities and progress.
  - Seeking Continuous Improvement as part of a review cycle.
- Should integrate Environmental Management into "Wastewater Treatment Plant" (WWTP) day to day operations as well as into the strategic organizational decisions by providing a systematic ("find, fix, and prevent") approach to managing the responsibilities.
- Must be dynamic to allow the WWTP to adapt to a quickly changing environment. For this reason, the EMS should keep understandable for the people who must implement it (the WWTP managers and employees).
- An EMS is designed to be applicable to all types of organizations and facilities. *[* Reference, 2].*

2 INTRODUCTION TO THE ISO 14001: 2004 EMS STANDARD

The ISO 14001:2004 is an International Standard for EMSs offering a common approach for all types and sizes of organizations to achieve and demonstrate sound environmental performance. The International Standard ISO 14001:2004 helps organizations manage the Environmental Impacts of their operations while always working toward Continuous Improvement. The International Standard ISO 14001:2004 is recognized and accepted worldwide.

The success of an EMS depends on the commitment of all the levels and functions of the organization and especially of the upper management. A system of this type permits to an organization to develop an Environmental Policy, to establish objectives and processes to reach the commitments of the politics, to take the necessary actions for improving its performance and to show the conformity of the system with the requirements of this international norm. The global objective of this International Standard is to support the environmental protection and the prevention of the contamination in equilibrium with the socio-economic needs.

2.1 PDCA Cycle

The International Standard ISO 14001 is based on the **PDCA Methodology** that can be described briefly as a **"Continuous Improvement Cycle".**

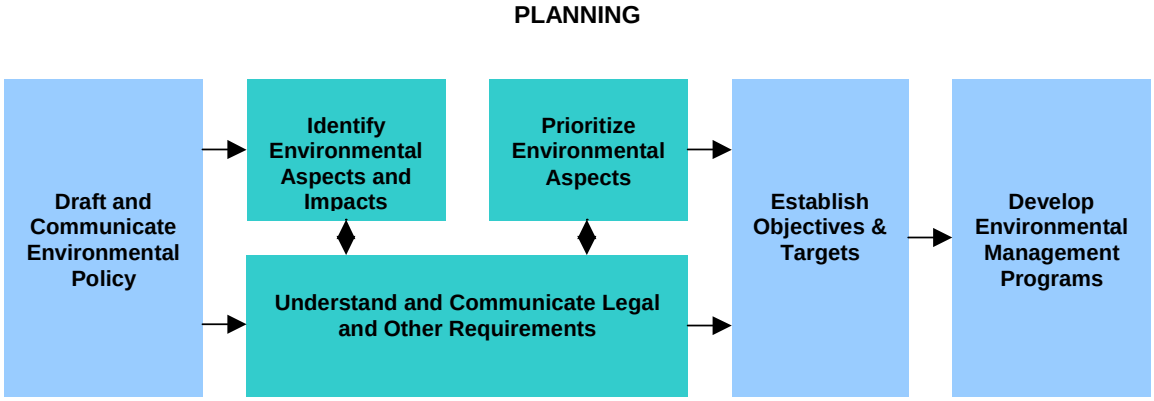
Therefore, PDCA cycle (Plan–Do–Check–Act) is the operating principle of the International Standard ISO 14001, and consists of four steps to follow for improvement or for making changes. Just as a circle has no end, the PDCA Cycle should be repeated again and again for Continuous Improvement.

2.1.1 PLAN

To improve the operations first by finding out what things are going wrong (that is identify the problems faced), and come up with ideas for solving these problems.

- **ACTIVITIES FOR PLANNING:**
    - Draft and communicate the WWTP Environmental Policy.
    - Create a procedure for understanding and communicating the Legal and Other Requirements.
    - Identify the Environmental Aspects & Impacts (both regulated and no regulated) of the WWTP operations and services.
    - Develop a method for prioritizing the Environmental Aspects.
    - Set realistic Objectives & Targets based on the Significant Environmental Aspects and Environmental Policy.
    - Develop action plans (i.e., Environmental Management Programs) that will help you to go from the start to finish line in meeting the Objectives & Targets.

      [Reference, 2].*



"Achieving Environmental Excellence: An Environmental Management Systems (EMS) Handbook for Wastewater Utilities". [Reference, 2].*

2.1.2 DO

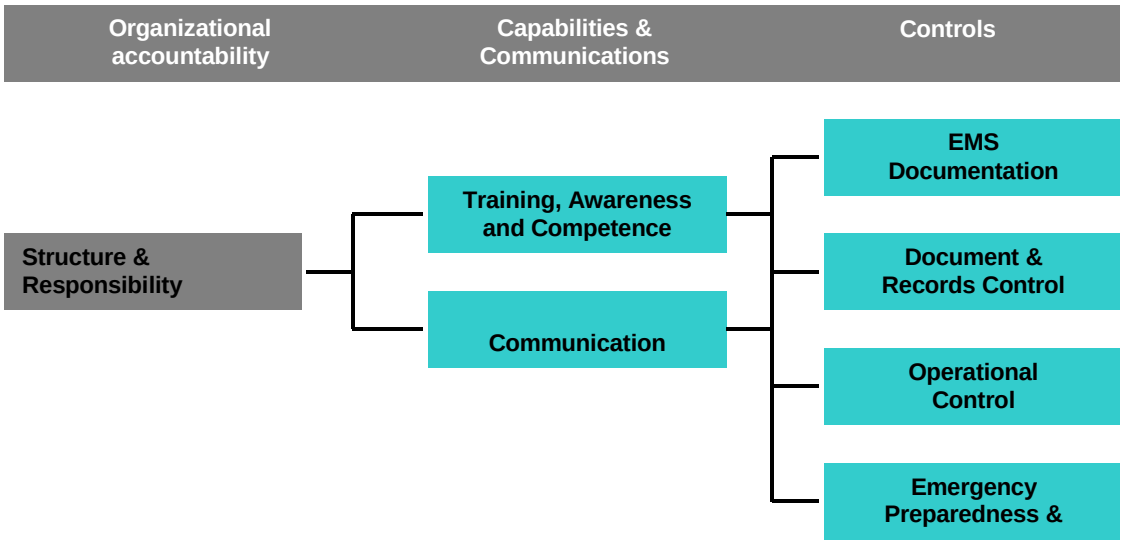
Changes designed to solve the problems on a small or experimental scale first. This minimizes disruption to routine activity while testing whether the changes will work or not.

- **ACTIVITIES FOR IMPLEMENTING OR "DO":**
  - Clearly define roles and responsibilities, particularly in regard to Significant Environmental Aspects.
  - Identify EMS Training, Awareness and Competence needs for all WWTP staff.
  - Establish effective Internal Communication process for information to flow top-down, bottom-up.
  - Establish ways to communicate effectively with external stakeholders about the EMS.
  - Establish Operational Control, including a review of existing standard operating procedures and other documentation (i.e., work instructions, manuals, etc.) for the WWTP operations that you determined were significant.

- Establish a system ensuring documents and records are current, accessible, and archived when appropriate.
- Identify potential emergency situations that could arise from day to day activities and operations, and review or create procedures or plans to address potential incidents.
- Establish normalized baseline data for operations with Environmental Objectives &Targets so that the targets can be measured and goals met or improved on.

[Reference, 2].*

IMPLEMENTING



"Achieving Environmental Excellence: An Environmental Management Systems (EMS) Handbook for Wastewater Utilities". [Reference, 2].*

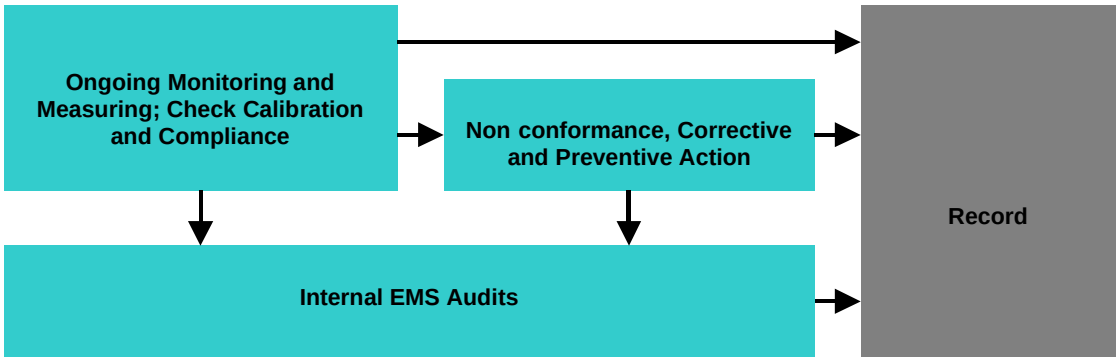
2.1.3 CHECK

Whether the small scale or experimental changes are achieving the desired result or not. Also, continuously Check nominated key activities (regardless of any experimentation going on) to ensure that you know what the quality of the output is at all times to identify any new problems when they crop up.

- **ACTIVITIES FOR CHECKING AND CORRECTIVE ACTION:**
  - Monitor and measure key characteristics of the EMS.
  - Determine compliance status.
  - Ensure that instruments used for monitoring and measuring are calibrated.
  - Develop and implement procedures for handling EMS Non-conformances.
  - Conduct internal EMS audits.
  - Maintain EMS records.

  [Reference, 2].*

CHECKING AND CORRECTIVE ACTION



" Achieving Environmental Excellence: An Environmental Management Systems (EMS) Handbook for Wastewater Utilities". [Reference, 2].*

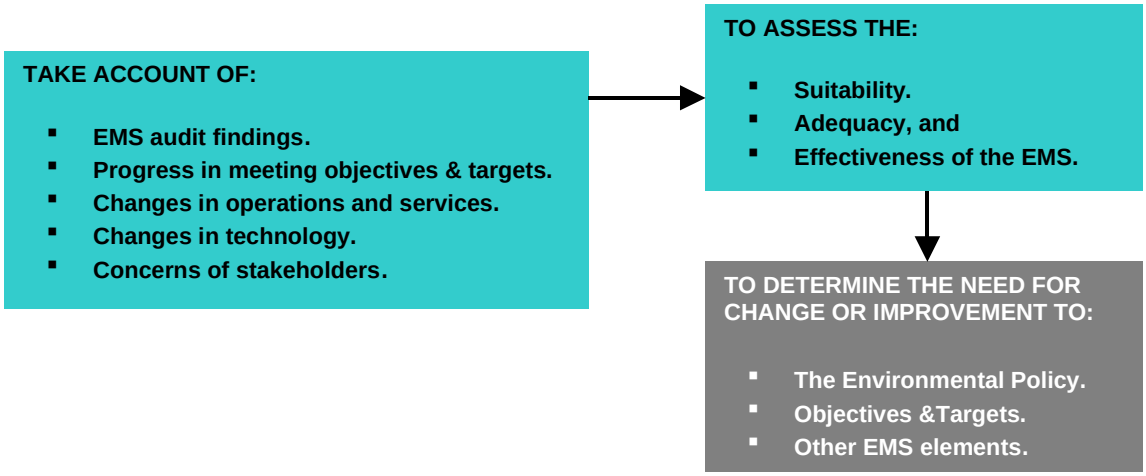
2.1.4 ACT

To implement changes on a larger scale if the experiment is successful. This means making the changes a routine part of your activity. Also Act to involve other persons (other departments, suppliers, or customers) affected by the changes and whose cooperation you need to implement them on a larger scale, or those who may simply benefit from what you have learned (you may, of course, already have involved these people in the Do or trial stage).

- **ACTIVITIES FOR MANAGEMENT REVIEW (ACT):**
  - Judge the suitability, adequacy, and effectiveness of the EMS.
  - Consider new organizational goals.
  - Apply lessons learned for Continuous Improvement.

  [Reference, 2].*

MANAGEMENT REVIEW (ACT)

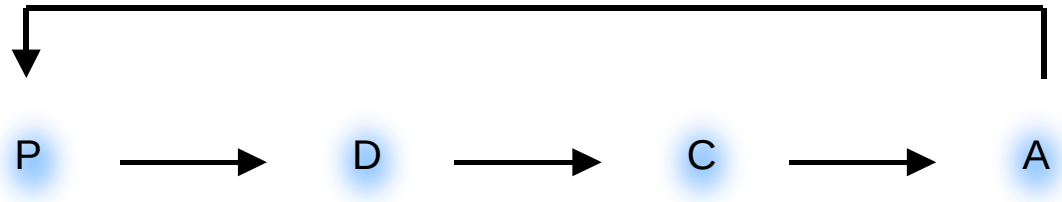


"Achieving Environmental Excellence: An Environmental Management Systems (EMS) Handbook for Wastewater Utilities". [Reference, 2].*

2.2 Requirements of the International Standard ISO 14001:2004

In order to effectively implement and benefit from an EMS based on the International Standard ISO 14001:2004, it is important to have an understanding of the requirements of the standard. A quick review of the standard shows that it is structured following the Plan, Do, Check, Act philosophy of the Total Quality Management movement, as follows:

The PDCA Cycle is the operating principle of the International Standard ISO 14001, and is very easy to relate them:



4.2 Environmental Policy	4.4 Implementation and Operation	4.5 Checking	4.6 Management Review
4.3 Planning	4.4.1 Resources, roles, responsibility and authority.	4.5.1 Monitoring and Measurement.	Continuous Improvement
4.3.1 Environmental Aspects.	4.4.2 Training, Awareness and Competence.	4.5.2 Evaluation of compliance.	
4.3.2 Legal and Other Requirements.	4.4.3 Communication.	4.5.3 Non-conformance, Corrective Action and Preventive Action.	
4.3.3 Objectives & Targets, Programme (s).	4.4.4 Documentation.	4.5.4 Control of records.	
	4.4.5 Control of Documents.	4.5.5 Internal Audit.	
	4.4.6 Operational Control.		
	4.4.7 Emergency Preparedness and Response.		
ENVIRONMENTAL POLICY			

2.3 Detailed section by section summary

4.2 Environmental Policy

The International Standard ISO 14001 requires that the organization (WWTP) have a policy statement to drive the EMS. These tend to be short, one page or fewer documents, and simply affirm the commitments. There is no expectation that specific details be noted in the policy. For example, the commitment to pollution prevention can simply be stated saying, "We are committed to prevention of pollution".

The policy must be clearly endorsed by top management and be available to the public and employees. Although the availability to the public can be rather passive; i.e. "is here if they want it", there is an expectation that the employee awareness is more proactive. Section 4.2 of ISO 14001 lists the other requirements of the policy.

The International Standard ISO 14001 Environmental Policy Commitments:

- Continuous Improvement.
- Pollution Prevention.
- Compliance with Relevant Laws and Regulations.

KEYWORDS:

- **Continuous Improvement:** The process of enhancing a organization's EMS to achieve improvement in overall environmental performance in line with the organization's Environmental Policy. The basic principle of the Plan, Do, Check, Act approach.
- **Environmental Policy:** An organization's formal statement defining its intentions and principles in relation to its overall environmental performance. It provides a framework for action and setting Environmental Objectives & Targets.
- **Pollution Prevention:** The development, implementation, and evaluation of efforts to avoid, eliminate, or reduce pollution at the source. Any activity that reduces or eliminates pollutants prior to recycling, treatment, control or disposal.

  [Reference, 2].*

KEYPOINTS:

- Keep the Environmental Policy simple, understandable, and to the point.
- Do not start from scratch. Use existing policies and organizational goals to document and expand the Environmental Policy. This will lead to positive, WWTP wide acceptance.
- When training the employees on the basics of the EMS policy, make sure they understand they do not have to memorize the policy. They do need to understand what your environmental commitments are related to the policy and be able to express that in their own words. Consider laminating and using badge/wallet size policy cards that employees can keep with them and that contain the basis of the WWTP Environmental Policy.
- When developing the Environmental Policy (and the EMS), it is critical that top management listen to the working conditions and concerns of all employees.
  [Reference, 2].*

COUNSELS:

- Keep the policy written with specific expectations provides employees with a straight-forward and realistic view of the environmental and EMS purpose.
- Include employees from across the WWTP facility when drafting the policy.
- Make sure the policy uses keywords from the International Standard ISO 14001 (i.e., pollution prevention, Continuous Improvement, and compliance), especially if the WWTP is working toward third-party certification.
  [Reference, 2].*

THINGS TO AVOID:

- Creating a Policy that too long. A lengthy policy makes it difficult for employees to identify the most important points. Make it one page or less.
- Not defining the WWTP boundaries (core operations and services) before drafting the Environmental Policy.
- Rushing the drafting process. Spend time drafting the policy since it really defines management's commitment to the EMS and sets the framework for development of the EMS. *[* Reference, 2].*

4.3.1 Environmental Aspects

This element requires a procedure that not only identifies the aspects and impacts, but also provides for determination of significance, and keeping the information up to date. The International Standard ISO 14001:2004 does not prescribe what aspects should be significant, or even how to determine significance. However, it is expected the organization will develop a consistent and verifiable process to do so.

KEYWORDS:

- **Environmental Aspect:** Element of an organization's activities, products or services that can interact with the Environment. Aspect = Causes.
- **Environmental Impact.** Any change to the environment, whether adverse or beneficial, that results from an organization's activities, products or services. Impacts= Effects.

  [Reference, 2].*

KEYPOINTS:

- The EMS Team(s) are terrific at producing input/process/output diagrams in the areas in which they work. This is a great opportunity for operational and environmental staff to discuss the facility and processes, perhaps for the first time.
- When you identify the aspects and their impacts, you want to identify.
  - Regulated Aspects (i.e., Air Emissions, Water Discharges, etc.)
  - Non Regulated Aspects (i.e., Electrical/Energy Use, Land Use, etc).
  - Emergency Situations/Conditions (i.e., Spills, Leaks, etc.).
  - Positive Impacts on the Environment (i.e., Recycling Paper, Reuse of Water, Using Biogas as an Energy Source, etc).
- Involving personnel from the frontline in identifying the inputs/processes/outpus and the aspects/impacts list is a good way to ensure buy in to the EMS. Besides, employees who are involved day to day with the front line operations are typically the best in identifying the environmental issues associated with activities (working with the environmental department).

- Educate the EMS Team and all employees on their roles and responsibilities in the Environmental Aspect/Impact Analysis.
- Define the significant ranking criteria for all employees who participate in the ranking process so that they know what the terms mean as they score aspects.
- Create cross-functional teams for the review. Include frontline employees from the applicable areas and the environmental department on the team(s) that conduct the aspects analysis.

  [Reference, 2]*

COUNSELS:

- Ensure the activities list for the aspects/impacts have potential or direct impacts on the environment. Do not list activities that have little or no impact on the environment (i.e., you do not have to list every single thing at your facility)
- Make the aspect ranking method simple and easy to understand.
- Keep the aspect analysis procedure flexible remember, this process is not set in stone if you do not feel the aspect analysis is working, change it! Remember, an EMS is about Continuous Improvement.

  [Reference, 2]*

THINGS TO AVOID:

- Breaking aspects into too much detail. For example, hazardous waste use and disposal in the lab does not need to be broken down into each chemical's hazardous waste use and disposal as an aspect.
- Making the significance threshold too low and thereby taking on too many Significant Aspects. Remember that for every Significant Aspect you name, you must have and Operational Control (i.e., procedures, manuals, work instructions, etc.) in place
- Getting bogged down when discussing applicable scores for an Environmental Aspect. Come to a consensus and move on.

  [Reference, 2].*

EXAMPLES:

Here are some examples from WWTP facilities.

Significant Aspect	Objective	Target
Pollution Prevention, Improved Biosolids Quality	Improve the Quality of Biosolids and Limit Their Effect on the Environment	Arrange for Dewatering and Land Application of Water Plant Residuals
Solid Waste Generation (All Operations)	Optimize Existing Recycling Program	Expand Recycling Program to Aluminum, Plastics, Glass, Cardboard and Packing Materials; Manhole Recovery
Potable Water Used in Mixing of Polymer (Gravity Belt Thickener Operation and Belt Filter Press Operation)	Reduce Potable Water Use	Reduce potable water use (m^3) by 10%
Water Effluent	Improve Water Quality in Watershed	1. Reduce Sediment in ABC Creek Stormwater by 10% by December 2005. 2. Participate in and Contribute to ABC Creek TMDL Implementation Team.
Sewer System Overflows (SSOs)	Reduce the number of sanitary sewer	Reduce SSOs by 40% from FY 2002 and 2003 normalized baseline levels.

"Achieving Environmental Excellence: An Environmental Management Systems (EMS) Handbook for Wastewater Utilities". [Reference, 2].*

4.3.2 Legal and Other Requirements

This is a requirement for a procedure that explains how the organization obtains information regarding its Legal and Other Requirements, and makes that information known to key functions. This is not the assessment or compliance audit requirement, but rather a more up front determination of requirements.

KEYWORDS:

- **Legal Requirements:** The set of rules and legal regulations that apply to the operations and services of an organization, including local, state, and federal laws.
- **Other requirements:** The rules and guidelines an organization follows that are not legally binding under existing environmental laws, but to which an organization is committed (i.e., industry standards or voluntary guidelines). Under an EMS, these requirements require the same commitment as legally binding requirements.

  [Reference, 2].*

KEYPOINTS:

- Document a summary of all Legal and Other Requirements in one easy to follow database or spreadsheet showing the requirements and to which operation or area they apply.
- Inform regulators of the efforts to implement an EMS at the WWTP facility in order to encourage an active dialogue about the value of an EMS approach.
- Provide training and communicate the requirements to employees in regulated areas in language they can easily understand.

  [Reference, 2].*

COUNSELS:

- Include clearly-defined roles and responsibilities in the methods to track requirements.
- Consider using a third-party to document the baseline of Legal Requirements.
- Conduct more frequent reviews of the Legal Requirements than other EMS elements. The wastewater industry is heavily regulated and changes can occur often.

  [Reference, 2].*

THINGS TO AVOID:

- Making the Legal and Other Requirements review a one-time only activity. You must keep up to date with changing requirements.

- Overlooking the communication of applicable requirements to front-line floor employees.
- Treating "other" requirements and voluntary initiatives as "minor" agreements.

  [Reference, 2].*

4.3.3 Objectives & Targets, and Program(s)

There is no requirement for a procedure in this element, only that Objectives & Targets be documented. It does require that certain items be considered in developing the objectives, such as Legal Requirements and prevention of pollution. It is sometimes the easiest to develop a procedure anyway for this element to be able to verify these considerations were made.

KEYWORDS:

- **Environmental Objective:** The internal goal the facility establishes to improve its environmental performance. Example: Reduce air emissions generated from the burning of diesel fuels.
- **Environmental Target:** A measurable performance requirement that arises from the objective. Example: Reduce sulphur dioxide, particulate matter, and carbon dioxide emissions from the burning of diesel fuels by 50% from 2002 levels.

  [Reference, 2].*

KEYPOINTS:

- Setting Objectives & Targets will help the WWTP translate environmental goals into measurable results. These goals can be factored into the WWTP strategic plans and can facilitate the integration of Environmental Management into the quality, health and safety, and other management programs.
- Being flexible in setting the Objectives & Targets. Defining a desired result, then let your employees in the areas where the Objectives & Targets will be set determine how to achieve the result. Employees within these areas will be in the best position to establish, plan, and achieve the goals, as well as recommend what is realistically

feasible. And remember, involving employees at all levels helps to build commitment to the EMS.

- Selecting the right performance indicators for Objectives & Targets can help you understand how well the EMS is working. Make sure you select indicators that actually allow you to measure what you are trying to improve.
- Examples of EMS performance indicator could include:
    - Number of odor complaints/weed.
    - Energy used per unit of production.
    - Percentage of solid waste recycled/used year.
    - Percentage of employees completing environmental training.
- Involving employees early that will participate and have responsibility in meeting the targets to establish and carry out the programs. Also, clearly communicate the expectations defined in the programs to those with responsibilities.
- Making sure the Objectives & Targets are realistic and that metrics for measuring progress and setting success points are in line with the WWTP goals.
- When communicating Objectives & Targets to employees, try to link them to their actual job activities and the reduced or positive impacts on the local community of which they live. Keep in mind that individuals respond to information that is meaningful to "their world", thereby increasing the likelihood they will follow through and act on the goals you are trying to achieve.

  [Reference, 2].*

COUNSELS:

- Track, review, and communicate the status the Objectives & Targets, an action plans, on a regular basis (i.e., monthly to ensure they are on track). Report on the objectives in a monthly status report to top management.
- Ask for volunteer(s) to "own" the Objectives & Targets. This allocates roles and responsibilities and increases EMS buy in.
- Keep in mind as you develop your Objectives & Targets and EMPs (Action Plans) that operations and divisions may have different priorities. Try and relate to each group when setting the goals. For example, show the cost savings of the objective to management and show the safety benefits to frontline employees. *[* Reference, 2].*

THINGS TO AVOID:

- Biting off more that you can chew. Begin with only two or three Objectives & Targets and make sure they are attainable and feasible for the WWTP facility.
- Not communicating time and resource requirements to divisional and line managers and supervisors so they can alert their employees of their Objective & Target and EMP responsibilities.
- Not establishing a normalized baseline from which to measure the targets. Normalized baselines are averaged to measure your actual environmental performance changes rather than changes in production, customer demand, or other non-environmental related factors.

  [Reference, 2].*

EXAMPLE:

Example Objectives & Targets from WWTP

Significant Aspect	Objective	Target
Pollution Prevention, Improved Biosolids Quality.	Improve the Quality of Biosolids and Limit Their Effect on the Environment.	Arrange for Dewatering and Land Application of Water Plant Residuals.
Solid Waste Generation (All Operations).	Optimize Existing Recycling Program.	Expand Recycling Program to Aluminum, Plastics, Glass, Cardboard and Packing Materials; Manhole Recovery.
Potable Water Used in Mixing of Polymer (Gravity Belt Thickener Operation and Belt Filter Press Operation).	Reduce Potable Water Use.	Reduce potable water use (m^3) by 10%.
Water Effluent.	Improve Water Quality in Watershed.	1. Reduce Sediment in ABC Creek Storm water by 10% by December 2005. 2. Participate in and Contribute to ABC Creek TMDL Implementation Team.
Sewer System Overflows (SSOs).	Reduce the number of sanitary sewer	Reduce SSOs by 40% from FY 2002 and 2003 normalized baseline levels.

[Reference, 2].*

4.3.4 Environmental Management Program (EMPs)

EMPs are the detailed plans and programs explaining how the Objectives & Targets will be accomplished. These EMPs usually note responsible personnel, milestones and dates, and measurements of success. Noting monitoring and measurement parameters directly in the EMP facilitates conforming to 4.5.1 on "Monitoring and Measurement" discussed below.

COUNSELS:

- Ask for volunteer (s) to "own" the Objectives & Targets. This allocates roles and responsibilities and increases EMS buy in.
- Track, review, and communicate the status of the Objectives & Targets, and action plans, on a regular basis (i.e., monthly to ensure they are on track). Report on the objectives in a monthly status report to top management.
- Keep in mind as you develop the Objectives & Targets and EMPs (Action Plans) that operations and divisions may have different priorities. Try and relate to each group when setting the goals. For example, show the cost savings of the objective to management and show the safety benefits to frontline employees.

  [Reference, 2].*

THINGS TO AVOID:

- Biting off more than you can chew. Begin with only two or three Objectives & Targets and make sure they are attainable and feasible for the WWTP facilities.
- Non communicating time and resource requirements to divisional and line managers and supervisors so they can alert their employees of their Objective & Target and EMP responsibilities.
- Non-establishing a normalized baseline from which to measure the targets. Normalized baselines are averaged to measure the actual environmental performance changes rather than changes in production, customer demand, or other non-environmental related factors.

  [Reference, 2].*

4.4.1 Resources, roles, responsibility and authority

The International Standard ISO 14001 requires that the relevant management and accountability structure be defined in this element. This usually takes the form of an organizational chart. Also, the organization must denote the Management Representative who is responsible to oversee the EMS and report to management on its operation.

4.4.2 Training, Awareness and Competence

The key point in this element is that personnel must receive applicable training regarding the EMS. Specific requirements are itemized in the International Standard ISO 14001, and include general, company-wide items such as knowing the policy, to more function-specific training on aspects and emergency response. An organization usually responds to this element with a training matrix, cross-referencing to training materials and records.

KEYWORDS:

- **EMS Awareness Training:** Training involving an overview of the basics of the EMS, including the Environmental Policy, Significant Aspects, Objectives & Targets, and the importance of operating under specific procedures and work instructions (Operational Control) required under the EMS.
- **Competency Training:** Employees whose work may create a Significant Environmental Impact must get appropriate training and be deemed competent based on education, training or experience. For example, most wastewater facilities need to have state licensed operators. The license is a way to demonstrate competency.

  [Reference, 2].*

KEYPOINTS:

- Relate EMS and environmental training to employee work activities.
- Create one training plan/program and integrate EMS training into it. For example, if you have an all employee health and safety training, add a few EMS slides to the presentation.
- Have division managers present at training sessions to show support for the EMS program.

  [Reference, 2].*

COUNSELS:

- Identify and document training requirements for each employee. For example, consider using a training matrix or table to identify employee titles, needs, and due dates.
- Get feedback from employees on the effectiveness of training materials and adjust your training based on their feedback.
- Make the EMS training part of other training you currently conduct (i.e., new employee orientation, health and safety, etc.).

  [Reference, 2].*

THINGS TO AVOID:

- Conducting training sessions that are too long. Keep your training sessions short, interesting and to the point.
- Making your EMS training too technical or "jargony".
- Having training sessions that "preach" EMS or Environmental Requirements. Remember to keep a "blue jeans, no tie" (relatable) message.

  [Reference, 2].*

4.4.3 Communication

Procedures are required for both internal and external communications. Note that ISO 14001 only requires procedures, and allows the organization to decide for itself the degree of openness and disclosure of information. Whatever the decision in terms of disclosure, that decision process must be recorded.

KEYWORDS:

- **External Communication:** Providing information and soliciting input, receiving inquiries and complaints, responding, and documenting exchanges with interested parties outside the boundary of the WWTP facilities.
    - Environmental Policy.
    - Significant Aspects (Optional).
    - Objectives & Targets (Optional).

  - Requirements to Suppliers and Contractors.
  - Annual Reports.
  - EMS Highlights and Successes (Optional but Highly Recommended).
- **Internal Communication:** Flow of information top-down, bottom-up, and across the entire EMS boundaries.
  - Environmental Policy.
  - Legal and Other Requirements.
  - Procedures and Work Instructions.
  - Roles & Responsibilities.
  - Significant Aspects.
  - Objectives & Targets.
  - EMS Progress and Success Stories.
  - EMS Audit Result.
- **Interested Parties ("Stakeholders"):** An individual or group, internal or external to the organization, concerned with or affected by the environmental performance of your organization. For example, local residents, citizen groups, and environmental regulators are all examples of "interested parties." In addition, consider your own employees inside and outside of the boundaries to be interested parties.
  [Reference, 2].*

KEYPOINTS:

- Remember that great ideas come from frontline employees that work directly in areas that affect the WWTP facility's Environmental Impact. Make sure there are ways for them to provide feedback to their line managers and to top management
- The WWTP may want to make a very proactive external communications approach, at least initially. Include an educational focus and promote an understanding of the environmental controls involved in the management of the WWTP facility this will lead to increased appreciation for the WWTP services by the community.
- Try using creative methods to communicate the EMS message. For example, in an effort to educate outside stakeholders and reward employees free admission was given to employees who provided EMS information at the admissions gate, while other ticket holders were given EMS information as they entered the game. In

addition, consider printing the EMS policy or a summary of the policy on mouse pads, coffee mugs, magnets, business cards, tee shirts, etc.

- In communicating with the employees, explain not only what they need to do, but also why they need to do it. For example, when describing a Legal Requirement, explain the purpose behind the rule and why it is important. Make a clear connection between the requirements and how it applies to each person's job.
- Get the word out on the EMS! Communication of the EMS (i.e., policy, cost benefits, Objective & Target performance, status of your EMSs, etc.) With internal and external stakeholders is key to obtain buy in from employees and maintaining external stakeholder support.

[Reference, 2].*

COUNSELS:

- Communicate EMS information up, down, and across the WWTP. This will promote buy in to the EMS.
- Keep internal messages simple, clears, concise, and fresh remember, keep it simple.
- Proactive (two-way) communication with external parties is important. The steps to obtain the view of external stakeholders. This will help you better understand how others perceive the WWTP and the EMS.

[Reference, 2].*

THINGS TO AVOID:

- Starting the EMS communication plans and procedures from scratch. Build on existing communication methods.
- Not communicating frequently on the progress of the EMS. Instead, send management and employees regular status updates of the EMS (i.e., send three EMS "good news bullets" each month in the newsletter):
- Not identifying and communicating with the key external stakeholders and seeking their input. If the local community and other external stakeholders are informed on what you are trying to achieve, can be critical allies for the WWTP.

[Reference, 2].*

EXAMPLES:

- **Internal Communication Vehicles:**
  - Employee Meetings.
  - Environmental, Health, and Safety Training.
  - Working lunches (free food).
  - Newsletters.
  - Pay Stub Inserts.
  - Intranet Bulletin Boards.
- **External Communication Vehicles:**
  - Annual Reports.
  - Steering Committees and/or Advisory Groups.
  - Media Releases.
  - Open Houses and Tours.
  - Websites.
  - Surveys.
  - Mailing & Newsletters to Local Communities.

[Reference, 2].*

4.4.4 Documentation

This requirement is simply that the WWTP has documented the system in either electronic or paper form such that it addresses the elements of the standard and provides direction to related documentation. Not all ISO 14001 required procedures need to be documented, as long as the system requirements can be verified.

KEYWORDS:

- **Controlled Documents:** Policies, procedures, manuals, and other documents part of the EMS that require control and maintenance. A controlled document is one that is reviewed for relevance to the activities on a regular schedule (typically annually) to ensure that the most current version is being used "in the field".

- **EMS Manual:** An EMS document that describes the core system elements and how the different elements are interrelated, a "roadmap" for the EMS. Auditors find a manual very useful when verifying the EMS.
- **EMS Records:** Reports, checklists, training, and other data generated that provides verification that the organization is following the EMS as intended.

  [Reference, 2].*

KEYPOINTS:

- Many WWTP and public organizations write one procedure for controlling and maintaining both their EMS documents and records. Take a look at what you have in place and integrate or develop a method that works best for the WWTP facility.
- An EMS Manual is a great tool for the internal and 3rd party auditors to follows to determine what the system looks like and how all the elements fit and link together. The Manual will reference procedures, work instructions, records, etc. relevant to each EMS element and provides auditors (and your own staff) with a "snapshot" of the system.
- Prepare a document control index that shows the entire EMS documents and the history of their revision. Include the index (or master list) in your EMS Manual.
- If the WWTP uses computers extensively, consider using an electronic EMS document and records. This can help you manage and track changes.
- Clearly explain the difference between EMS documents and records and how they are managed.

  [Reference, 2].*

COUNSELS:

- Develop a document management system early in the EMS implementation so that EMS documentation will be immediately managed. Use the existing document format and control system if you have one.
- Create a file folder on the WWTP intranet that will house and control the most current versions (and change history) of the EMS documents instead of printing and distributing multiple revisions. Remind staff that ONLY the electronic version is the most current and the one that is to be followed.

- Establish a records retention policy and stick to it. Consider what is required for the compliance obligations.
  [Reference, 2].*

THINGS TO AVOID:

- Collecting and maintaining EMS records that do not add value. If records have no value or are not specifically required, do not collect them. Start with compliance records and records that you use to track the Objectives & Targets and Significant Aspects.
- Not establishing clear procedures on who can generate and make changes to the EMS and environmental documents. Limiting access and control of documents will make tracking and updating them easier.
- Creating an EMS Manual that is too lengthy. Keep the manual to no more than ½ to page per EMS system element. Remember, easy to understand and to the point equals easy to implement.

4.4.5 Control of Documents

Procedures are required to control documents, such as system procedures and work instructions, and to ensure that current versions are distributed and obsolete versions are removed from the system.

4.4.6 Operational Control

This element is the one that connects the EMS with the organization as a whole. Here, the critical functions related to Significant Aspects and Objectives & Targets are identified and procedures and work instructions created to ensure proper execution of activities. Requirements for communicating applicable system requirements to contractors are also addressed.

KEYWORDS:

- **Operational Control:** Documents that specify the way to execute a certain activity or operation. Operational Control are assigned to operations and service involving significant aspects and are documented through the use of work instructions, procedures, manuals, programs, etc.

  [Reference, 2].*

COUNSELS:

- In determining which operations and activities need to be controlled, look beyond operations and services. Activities such as equipment maintenance, management of on site contractors, and services provided by suppliers or vendors could affect the WWTP´s environmental performance significantly.
- Use photos and diagrams where applicable for the WWTP Operational Control. For example, a diagram showing the direction and how far to turn a valve is much clearer than text.

  [Reference, 2].*

THINGS TO AVOID:

- Not including suppliers and contractors that provide operations, goods, and services that have a direct impact on the WWTP facility's Significant Aspect and Objectives & Targets. Cross-reference the Significant Environmental Aspect list and the Objectives & Targets with the associated supplier and contractor operations to ensure Operational Control.
- Starting from scratch when developing the Operational Control. Most WWTP had about 80% of the necessary documentation in place when they began their EMS implementation.
- Overlooking the maintenance and calibration of equipment for Significant Environmental Aspect areas and Objectives & Targets. Maintenance manuals and calibration records also demonstrate control.

  [Reference, 2].*

4.4.7 Emergency preparedness and Response

Although typically addressed through conventional emergency response plans, this element also requires that a process exist for identifying the potential emergencies, in addition to planning and mitigating them. A linkage to the aspects analysis, where impacts are assessed, is appropriate. Emergency incidents include those that may not be regulated, but may still cause significant impact as defined by the organization.

KEYWORDS:

- **Emergency Situation:** Condition (i.e., spills, releases, fires, etc.) that can have an Environmental Impact and that requires an emergency response or action.
- **Emergency Response:** Actions taken to address an environmental incident.
- **Emergency Response Plan:** A detailed plan that describes the logistics, procedures, who to contact, roles and responsibilities, reporting requirements, etc. in the event of an emergency or spill.
- **Vulnerability Assessment:** A tool to assist water utilities in systematically evaluating their susceptibility to potential threats and identifying corrective actions that can reduce or mitigate the risk of serious consequences from adversarial actions (i.e., vandalism, insider sabotage, terrorist attack, etc.).
  [Reference, 2].*

KEYPOINTS:

- Evaluate the effectiveness of the emergency response plans on a regular (at least annually) basis by conducting drills and exercises. Ensure that all emergency response actions are reviewed and documented.
- Make emergency response plans available, easily accessible, and clearly understood by everyone who might need them. Effective training and well communicated plans will help prevent and minimize potential Environmental Impact that could occur as a result of the accident or emergency.
- Evaluate the effectiveness of the emergency response procedures/plans and vulnerability assessments on a regular basis (at least annually). Consider using the WWTP staff in the emergency and security drills as part of their training program.

- Communicate with local officials (fire department, hospital, etc.) about potential emergencies at the WWTP facility and how they can support the response efforts. Involving local responders in mock drills is an excellent way to reinforce training, keep them informed of any changes to operations, and get feedback on the effectiveness of the plans/procedures.

  [Reference, 2].*

COUNSELS:

- Be very clear on staff roles and responsibilities related to emergency prevention and response.
- Be specific about who in the WWTP will conduct the emergency response training and when it will be conducted. Where practical, consider conducting training in cooperation with relevant external parties and first responders, including local and regional emergency y response agencies.
- Post copies of the emergency plans (or at least critical contact names and phone numbers) around the WWTP facility, especially in areas where potential hazards exist. Include phone numbers for the on sit emergency coordinator, local fire department, local police, hospital, and rescue squad members as appropriate.

  [Reference, 2].*

THINGS TO AVOID:

- Not inviting local emergency response agencies into the WWTP facility for emergency reviews and drills. Local responders need to know the layout an any changes to operations of the WWTP facility. In addition, response agencies can assist you in developing and updating the response plans.
- Thinking only about response focus on how to prevent accidents and emergencies in the first place.
- Starting the Emergency Preparedness and Response procedures (plans from scratch). Build on what you currently have in place for responding to emergencies and accidents.

  [Reference, 2].*

4.5.1 Monitoring and Measurement

Procedures are required describing how the organization will monitor and measure key parameters of operations. These parameters relate to the Significant Aspects, Objectives & Targets and legal and regulatory compliance. In order to properly manage the system, measurements must be taken of its performance to provide data for action. Responses to this element usually cross reference to many other specific procedures and work instructions describing measurement and equipment calibration. It is in this element that we find the requirement for what is commonly referred to as a compliance audit.

KEYPOINTS:

- Evaluate the information that you collect for value. If you are going to spend the time and resources to collect it, make sure that it is useful.
- Include top management and other decision makers in setting up what you will monitor and measure. Checking in with them will help you identify what you need to measure to provide meaningful results and maximize the benefits you'll receive from the EMS.
- Remember the external stakeholders (i.e., city commissioners, citizen groups, etc.) as you determine what to monitor and measure.

  [Reference, 2].*

COUNSELS:

- Star with a relatively simple monitoring and measurement process, looking at the Legal Requirements and Significant Aspects. It is OK to start small and build over time as you gain experience in evaluating the performance.
- Select performance indicators performance indicators that will provide the information you need to make effective decisions about your EMS.
- Do not forget about on and off-site contractors that calibrates and/or maintain equipment that is within your identified significant operations and services.

  [Reference, 2].*

THINGS TO AVOID:

- Going out of the way to monitor and measure everything. Start with what is required by law and then examine the Objectives & Targets.
- Not committing the necessary resources to track performance information over time.
- Not communicating the performance and progress of the Objectives & Targets to management and staff.

  [Reference, 2].*

4.5.2 Evaluation of compliance

This element is a new clause of the ISO 14001:2004, but not a new requirement (this is found in 4.5.1 in ISO 14001:1996). This has been made into a separate clause to highlight the importance of this function and now clarifies the purpose of this clause as "ensuring the organization meets its commitment to compliance with Legal Requirements".

Evaluation of Compliance is recognized as distinct and separate EMS Element in the new International Standard ISO 14001:2004. In the 1996 Standard, this requirement was part of the Monitoring and Measurement Element. To comply with the new requirements for this element, organizations must establish, implement, and maintain a procedure(s) for periodically evaluating their compliance with respect to both applicable Legal Requirements and other requirements to which they subscribe. In addition, organizations must keep records of these evaluation(s).

The primary purpose of an EMS is to provide a framework that enables an organization to control the Environmental Impact of its activities, products and services, to improve its environmental performance continually, and to commit to sustainable development as a strategic objective. Although ISO 14001 does not specifically require compliance with applicable environmental laws and regulations and other requirements, the Standard does expect an organization to apply the principle of Continuous Improvement to compliance during the planning, implementation, and maintenance of its EMS

4.5.3 Non-conformance, Corrective Action and Preventive Action

This element requires procedures for acting on Non-conformances identified in the system, including corrective and preventive action. Non-conformances may be identified through audits, monitoring and measurement, and communications. The intent is to correct the system flaws. Typically, Corrective Action Report (CAR) forms are the nor, the suggested fix, and closure of the action when completed. Note that this requirement does not imply in any way that the party identifying the Non-conformance must be the one to suggest the fix. Instead, it is expected that the system provides for the information to be routed to the most appropriate party to address the concern.

KEYWORDS:

- **Corrective Actions:** As a result of the audit findings, Corrective Action Reports (CARs) are assigned to all Non-conformances to correct EMS deficiencies as they occur. CARs track an audit finding, and assign tasks to be completed, responsibilities, and timeframes.
- **Corrective Action Report (CAR):** A report form to identify, track and manage corrective actions.
- **Major Non-conformance:** A deficiency in meeting the requirements of an EMS. One or more of the 17 elements of the EMS are not addressed (i.e., no system procedure) or implemented (i.e., not following a system procedure as written).
- **Minor Non-conformance:** A finding that leads to a failure to conform completely with an EMS element, but is not considered to be a breakdown in your system. For example, a number of employees were overdue on their EMS refresher training.

  [Reference, 2].*

KEYPOINTS:

- Follow a find, fix and prevent approach for smaller issues rather than go through documentating Non-conformances. If you are unsure which approach to follow you can start by documenting every finding and filling out a corrective action report (CAR) and then scale back at a later date. Remember, an EMS is about Continuous Improvement.

- Focus on correcting and preventing problems. Preventing problems is cheaper than fixing them after they occur (or after reoccur).
- EMS Non-conformances should be analyzed to detect patterns or trends. Identifying trends allows you to anticipate and prevent future problems as well as identify things going well.
- Be sure that your corrective & preventive action process specifies roles and responsibilities and schedules for completion for Corrective Action Reports (CARs).

  [Reference, 2].*

COUNSELS:

- The corrective actions should be based on good information and analysis of root cause. While may corrective actions may be "common sense" you need to look beneath the surface to determine why problems occur.
- Designate employees from the areas where the Non-conformances occurred as the ones responsible for implementing their corrective and preventative actions. The personnel will be the best at identifying appropriate corrective and preventative actions, and the process will get them involved in the EMS.
- Review the EMS progress regularly and follow up to ensure that corrective actions taken.

  [Reference, 2].*

THINGS TO AVOID:

- Starting from scratch. If the WWTP has a system for correcting environmental compliance findings and/or an ISO 9001 Management System, use your current methods as models (or integrate with them) for the EMS.
- Not documenting EMS activities that are going well. In addition to documenting Non-conformances or problems with the EMS, identify and document EMS successes. This will motivate the WWTP staff and help ensure EMS buy in.

  [Reference, 2].*

4.5.4 Control of Records

Records are expected to exist to serve as verification of the system operating. For example, records include audit reports and training records. Unlike controlled documents, records are "once and done" documents, resulting from the execution of some process or procedure. Procedures in this element are required for the maintenance of records.

4.5.5 Internal Audits

ISO 14001 requires that the system provide for internal audits. This procedures(s) will include methodologies, schedules, and processes to conduct the audits. Interestingly, the EMS audit will in essence, audit the audit process itself!

KEYWORDS:

- **Audit Finding:** A discovery of lack of conformance to the requirements of an EMS criteria/checklist. All audit findings must be resolved as found during the internal audit or through a formal EMS process of corrective and preventative action.
- **EMS Audit:** A planned and documented review performed in accordance with a documented audit procedure for the purpose of verifying, through interview and an evaluation of EMS documents and records, conformance with the applicable elements of the EMS.
- **EMS Auditor:** A qualified and trained individual who conduct EMS audits. Each EMS Auditor should attend documented training that presents the requirements of a standard EMS and of your organization's EMS audit procedure and discusses their roles in an EMS internal audit.
- **EMS Lead Auditor:** A qualified and trained individual who plans, organizes, and directs the WWTP´s EMS internal audits. The EMS Lead Auditor is the leader of the EMS audit team an will report audit findings and observations to management.

  [Reference, 2].*

KEYPOINTS:

- Streamline the EMS internal auditing process to be understandable for employees. Do not make the process too lengthy or complicated.
- Perform an internal audit of the EMS system and processes-not individuals.
- Make the EMS internal audit process positive (identify the good things and compliment people) as well as identify the opportunities for system improvements.

  [Reference, 2].*

COUNSELS:

- Make "cheat sheets" for the employees. For example, post Significant Aspects and Objectives & Targets in work areas and have wallet cards made of the Environmental Policy so that employees do not have to memorize the EMS.
- Work with the WWTP staff's schedule so that you do not disrupt the routine of daily operations in the area you are auditing; be flexible with your audit schedule.
- Establish a well defined audit schedule and plan. Also, use an EMS checklist. These tools will effectively prepare the EMS auditor(s) and keep the audits consistent.

  [Reference, 2].*

THINGS TO AVOID:

- Trying to be too "textbook" and/or using too much EMS jargon during the internal audits. The internal auditors should take what they know and relate it to the activities that are being reviewed- the tie in the EMS requirement.
- Not providing the necessary training for the internal auditors. Make sure the auditors understand the EMS and the International Standard ISO 14001 requirements and what you are trying to accomplish with the internal audits.
- Not preparing staff for the EMS Audits; all employees should understand what is expected of them during an EMS internal audit.

  [Reference, 2].*

4.6 Management Review

This element requires that periodically, top management will review the EMS to ensure it is operating as planned. If not, resources must be provided for corrective action. For areas where there are no problems, is expectived in the future management will provide for improvement programs. Usually there is no detailed procedure for this element, although records of agendas, attendance, and agreed upon action items are maintained as verification.

KEYWORDS:

- **Continuous Improvement:** The principle of Continuous Improvement, as fundamental to the International Standard ISO 14001, is intended to ensure that an organization does not simply adopt an EMS, or other Plan-Do-Check-Act based Management System, for cosmetic purposes and thereby remain static. Continuous Improvement is the process of enhancing a Management System to achieve improvement in overall performance and effectiveness in line with the organization's management policies.

  [Reference, 2].*

KEYPOINTS:

- Top management must receive frequent updates, especially with regard to the status and performance of the EMS Objectives & Targets.
- Management Reviews should assess how changing circumstances might influence the suitability, effectiveness or adequacy of the EMS. Changing circumstances might be internal to the WWTP (such as new laws, new scientific information, changes in political leadership, or changes in adjacent land use).
- As you assess potential changes to the EMS, consider other organizational plans and goals. In this way, environmental decision-making can be integrated into the overall management and strategy.

  [Reference, 2].*

COUNSELS:

- Communicate and review with top management to find out what they would like to see in order to assess the EMS. If the meeting is relative to management, they will continue to be more engaged and committed to the EMS.
- Provide top management with just a summary of the EMS. Top management are "big picture" people and do not need a lot of detail during the Management Review meetings.
- Ensure that all levels of management (division, line managers, etc.) participate in Management Review meetings.

  [Reference, 2].*

THINGS TO AVOID:

- Not communicating with top management on what they would like to review to access the performance of the EMS.
- Conducting only annual reviews. Consider having Management Reviews every quarter to give management an update and to check the progress of the EMS.
- Not training top management on the fundamentals of an EMS. If Management understands what an EMS can do for you, they will understand what it can accomplish for the WWTP.

  [Reference, 2].*

2.4 The International Standard ISO 14001:2004. Registration

EMS third party registration provides a check that an organization has met the requirements of an ISO 14001 EMS and has demonstrated a commitment to Environmental Management and improvement.

Furthermore, public organizations have achieved a number of benefits from EMS implementation and registration/certification, including public (local community) recognition and managing environmental issues in a more consistent way. This section describes the process and benefits of having your facility go through a third party review based on the ISO 14001 International EMS Standard.

KEYWORDS:

- **Registration:** A recognized validation that an EMS has passed an accredited independent, third-party audit.
- **Self-Declaration:** An internal review of conformance to all elements of an EMS. EMS self declaration is an organization's statement that it conforms with all elements of the International Standard ISO 14001.

  [Reference, 2].*

KEYPOINTS:

- Be flexible. Do not stress over on site recommendations during the EMS third party registration audit. The auditor should allow ample time to modify and close out any minor or major Non-conformances.
- Prepare the Steering Committee. EMS Team, Department Supervisors and frontline employees concerning questions that could arise during the third party audit. The frontline level employees need to understand that they do not need a textbook answer for a question. Simply tell them to answer questions in their own words.
- Make "cheat sheets" for the employees (i.e. post the significant aspects, impacts, objectives, targets, environmental policy, and emergency procedures in all departments). This allows the employees an avenue of discussion with the auditor if they cannot remember the details. The employee can show the third party auditor the bulletin board information.
- Look for ISO 14001 third party auditors with wastewater treatments and public sector credentials and experience.
- Look for registrars that have a Board of Directors and a mechanism to give feedback on their auditing. Sometimes, auditors can be inflexible and difficult to work with. Discuss this with their review board or the auditing organization they work for.

  [Reference, 2].*

COUNSELS:

- Do not be afraid to disagree with the auditor and stand up for the program if you feel what you have done meets the requirements of the standard.

- Contact other organizations that have been successful in passing their third party registration audit for information and documentation examples, so that you learn from the experiences of other organizations.
- Keep it simple! This is particularly true for the Environmental Aspect identification and for how you determine environmental significance. If you have a complicated aspect analysis system, third party registration may be harder to maintain.
- Only have one current procedure available for what you do. Remove old documents before the third party audit.
- When the third party auditors come out to review the EMS, make sure to stress to employees that the auditors are not auditing them, but auditing a system.

  [Reference, 2].*

THINGS TO AVOID:

- Scheduling audits with major commitments prior to and after the audit. You will want ample time to reflect on the system prior to the audit and after.
- Unnecessary interruptions during the registration audit.
- Selecting registrars with no technical or related industry expertise.
- Being unprepared! The Environmental Management Representative, Document Administrators and all key staff must be prepared before a third party audit.

  [Reference, 2].*

3 INTRODUCTION TO THE EMAS, Eco-Management & Audit Scheme

The EMAS is a management tool for companies and other organization, as WWTP, to evaluate, report and improve their environmental performance.

To receive EMAS registration an organization must comply with the following steps:

1. To conduct an Environmental Review considering all Environmental Aspects of the WWTP activities, product and services, methods to assess these, its legal and regulatory framework and existing Environmental Management practices and procedures.

2. In the light of the results of the review, to establish an effective EMS aimed at achieving the WWTP´s Environmental Policy defined by the top management. The Management System needs to set responsibilities, objectives, means, operational procedures, training needs, monitoring and communication systems.

3. To carry out an environmental audit assessing in particular the management system in place and conformity with the WWTP´s policy and programme as well as compliance with relevant environmental regulatory requirements.

4. To provide a statement of its environmental performance that lays down the results achieved against the environmental objectives and the future steps to be undertaken in order to Continuous Improvement the WWTP's environmental performance.

The Environmental Review, EMS, audit procedure and the environmental statement must be approved by an accredited EMAS verifier and the validated statement needs to be sent to the EMAS Competent Body for registration and made publicly available before an organisation can use the EMAS logo.

3.1 Requirements of EMAS

Develop an Environmental Policy

As it is mentioned in the point 2.3 (detailed section by section summary), the Environmental Policy is a document that describes the WWTP's overall aims and principles of action with respect to the environment. All organizations have an Environmental Policy, though not always formally stated. Sometimes the importance of making the policy explicit is overlooked, but it is a crucial element in building a consistent framework for action. Without such a basic document, all further steps become unclear. The Environmental Policy, adopted at the highest managerial level and revised periodically, should contain at least two central elements: compliance with relevant environmental regulations and a commitment to Continuous Improvement.

- Address all significant environmental issues.
- Commit to comply with environmental legislation.

- Commit to achieve Continuous Improvements in your environmental performance.

Make an Initial Environmental Review

The Environmental Review is an initial comprehensive analysis of the environmental problems caused by the organization's activities. The outcome is a report that includes hard data about consumption of raw materials and energy, production of wastes and emissions, but also information on the indirect Environmental Impacts of the activities of an organisation and the management structures in place to deal with these impacts. The purpose of the initial review is to identify the most Significant Environmental Impacts, and therefore possible priorities to be set in the environmental programme, and to lay down a benchmark to measure future success in reducing these impacts.

Develop an Environmental Programme

The Environmental Programme translates the general objectives established in the Environmental Policy into specific targets, determining concrete measures, time frames, responsibilities, and the resources necessary in order to meet them. The measures laid out in a environmental programme can be of a technical and/or organisational nature. All of the WWTP's activities from top management to the lower levels should be involved in these measures.

- Make a detailed work plan.
- Set specific objectives and measures.
- Update it regularly.

Establish an EMS

To ensure the successful implementation of the Environmental Programme, you need to establish operating procedures and controls. For instance, you may have to revise the organisational chart that lays down the responsibilities in the various departments in order to address environmental issues. Or you may have to change performance criteria to reflect new environmental responsibilities. Apart from the Environmental Impact of

production activities and housekeeping activities, an EMAS has to include the indirect Environmental Impacts of the WWTP's activities, products or services, i.e., for a financial institution the Environmental Impacts of a WWTP's credit management. Part of the EMS can also be provisions to benefit from an EMAS participation of the customers or suppliers.

- Aim at achieving policy's commitments.
- Base the EMS on the initial review.
- Set responsibilities, operational procedures, training needs, monitoring and communication systems.

Carry out an Internal Environmental Audit

Internal Audits are a normal feature of the Management Systems. The Environmental Audit evaluates the environmental performance of a company bases on the objectives spelled out in the environmental programme. Through the audit you can evaluate to which extent your staff members follow the operating procedures and rules of the EMS and whether or not the EMS is capable of achieving the objectives set out in the environmental programme. The audit must be repeated regularly. The outcome of the environmental audit is a report in which possible corrective actions are suggested to guarantee Continuous Improvement of the WWTP's environmental performance.

- Cover all activities and all Significant Environmental Impacts.
- Assess the Management System.
- Check conformity with the Environmental Policy and programme.

Review once more

The improvement of environmental performance can be achieved also by making the system more and more efficient. That is why the WWTP's top management is required to check periodically the consistency of the organisational approach and its capability to meet the goals stated in the policy and the programme. The idea of Continuous

Improvement is that, through a formalised system, mistakes are recorded, analysed and that their immediate and remote causes are removed.

- Correct mistakes in the EMS.
- Update the Environmental Objectives.

Develop an Environmental Statement

The Environmental Statement is a clear and concise document addressed to the WWTP's stakeholders. In this document, the WWTP describes its environmental efforts and achievements as well as the requirements for continuous environmental performance. Present the activities and the environmental performance.

- Present the Environmental Policy, programme and Management System.
- Communicate the results of the work to the public and other interested parties.

Get validation and register

When all of the above has taken place, an independent verifier certifies that the organization's Environmental Policy, its EMS, the environmental audit and the environmental statement comply with the rules of the EMAS regulation. After the validated statement is sent to the Competent Body it has to be made publicly available. Then the organisation is listed in the register of EMAS organisations and has the right to use the EMAS logo.

- Use the EMAS logo.
- Get official recognition.

EMAS is generally a site based registration system with due consideration provided to off site activities that may have a bearing upon the products and services of the primary site. Within the UK an extension to the scheme has been agreed for local government operations, which may also register their EMSs to the EMAS Regulations.

EMAS requires an Environmental Policy to be in existence within the organization, fully supported by senior management, and outlining the policies of the company, not only to

the staff but also to the general public and other stakeholders. The policy needs to clarify compliance with Environmental Regulations that may effect the organisation and stress a commitment to Continuous Improvement. Emphasis has been placed on policy as this provides the direction for the remainder of the Management System.

Those companies who have witnessed ISO 9001 Assessments will know that the Policy is frequently discussed during the assessment, many staff are asked if they understand or are aware of the policy, and any problems associated with the policy are seldom serious. The Environmental Policy is different; this provides the initial foundation and direction for the Management System and will be more stringently reviewed than a similar ISO 9001 Policy. The statement must be publicised in non-technical language so that the majority of readers can understand it. It should relate to the sites within the organisation encompassed by the Management System, it should provide an overview of the WWTP's activities on the site and a description of those activities, this is a clear picture of the WWTP's operations.

In addition to a summary of the process, the statement requires quantifiable data on current emissions and environmental effects emanating from the site, waste generated, raw materials utilised, energy and water resources consumed, and any other Environmental Aspect that may relate to operations on the site.

The preparatory review is part of an EMAS Assessment. The Environmental Review must be comprehensive in consideration of input processes and output at the site. This control process is designed to identify all relevant Environmental Aspects that may arise from existence on the site. These may relate to current operations, they may relate to future, perhaps even unplanned future activities, and they will certainly relate to the activities performed on site in the past (i.e., pollution of land).

The initial or preparatory review will also include a wide-ranging consideration of the legislation that may affect the site, whether it is currently being complied with, and perhaps even whether copies of the legislation are available. Many of the environmental assessments undertaken already have highlighted that companies are often unaware of ALL of the legislation that affects them, and being unaware, are often not meeting the requirements of that legislation.

The WWTP will declare its primary environmental objectives, those that can have the highest Environmental Impact. In order to make profit these will become the primary areas of consideration within the improvement process, and the WWTP's environmental programme. The programme will be the plan to achieve specific goals or targets along the route to a specific goal and describe the means to reach those objectives such that they are real and achievable. The EMS provides further detail on the environmental programme. The EMS establishes procedures, work instructions and controls to ensure that implementation of the policy and achievement of the targets can become a reality. Communication is a vital factor, enabling people in the organisation to be aware of their responsibilities, aware of the objectives of the scheme, and able to contribute to its success.

4 EMAS vs. ISO 14001 INTERNATIONAL STANDARD

EMAS and the International Standard ISO 14001 have the **common objective** of providing for good Environmental Management. However yet too often they are seen as competitors. The Commission has recognized that the International Standard for EMSs, EN ISO 14001, can provide a **stepping-stone for EMAS**. The adoption of EN ISO 14001 as the **EMS** element of EMAS will allow organizations to progress from EN ISO 14001 to EMAS without undue duplication of effort.

The two registration schemes are not "different versions of the same thing", but rather different depths. The ISO 14001 is effectively the management element of EMAS and can stand alone, while registration under EMAS requires an ISO 14001 based management system as well as additional elements such as an Environmental Statement that is verified by a suitably competent person.

4.1 What is the difference between ISO14001 and EMAS?

EMAS goes beyond the International Standard ISO 14001 in a number of ways, requiring the undertaking of an initial Environmental Review, the active involvement of employees in the implementation of EMAS, and the publication of relevant information to the public and other interested parties.

Notable differences include:

- **Preliminary review:** EMAS requires a verified initial environmental review. The International Standard ISO 14001 does not.
- **Public availability:** EMAS requires that the policy, programmer, EMS and details of the organizations performance are made publicly available as part of the environmental statement. The International Standard ISO 14001 requires only that the policy be publicly available.
- **Audits:** The International Standard ISO 14001 requires audits, although the frequency is not specified nor is the audit methodology set out in as much detail as in EMAS.
- **Contractors and suppliers:** EMAS is slightly more explicit in its control over contractors and suppliers, requiring that procurement issues are addressed and that the organization endeavours to ensure that contractors and suppliers comply with the organization's Environmental Policy. The International Standard ISO14001 requires that relevant procedures be communicated to contractors and suppliers. In effect there should be no difference.
- **Commitments and requirements:** The International Standard ISO14001 does not stipulate the extent to which performance must be improved. EMAS specifies that organizations must attempt to "reduce Environmental Impacts to levels not exceeding these corresponding to economically viable application of best available technology".

SYSTEM ELEMENT	ISO 14001:2004	EMAS
EMS	4.0	ANNEX I, Part B
Preparatory Environmental Review	ANNEX A 4.2.1	Article 3, Paragraph b ANNEX I, Part C
Environmental Policy	4.1	ANNEX I, Part A and D
Organisation and Personnel	4.3.1, 4.3.2	ANNEX I, Part B2 & D11
Environmental Effects/ Aspects	4.2.1, 4.2.2	ANNEX I, Part B3 & D2/3
Objectives & Targets	4.2.3	ANNEX I, Part A4
Environmental Management Programme	4.2.4	ANNEX I, Part A5
Manual and Documentation	4.3.4, 4.3.5	ANNEX I, Part B5
Operational Control	4.3.6, 4.3.7, 4.4.1, 4.4.2	ANNEX I, Part B4 & D6-7
Records	4.4.3	ANNEX I, Part B5
Internal Audits	4.4.4	ANNEX I, Part B6, ANNEX II
Management Review	4.5	ANNEX I, Part B1
Environmental Statement	N/A	Article 5 and ANNEX V

Correspondence between International Standard ISO 14001: 2004 and EMAS
[Reference, 12]*

4.2 How to implement EMAS if EN ISO14001 already exists?

The recent revisions to EMAS have made it easier for organizations already certified to the International Standard ISO 14001 to attain EMAS registration. For these organizations there will be some **minor modifications** to be made to the core ISO 14001 elements plus some **additional steps** specific to EMAS.

4.2.1 Additional Steps for EMAS registration

- **Initial Environmental Review:** The EMAS regulation requires that an initial Environmental Review be performed to identify an organization's Environmental

Aspects. However, when an organization already has an EMS certified to ISO 14001 it does not need to conduct a formal Environmental Review.

- **Environmental Statement:** The organization shall prepare an Environmental Statement, based on the outcome of the EMS performance audit. The organization should check that the Environmental Statement fulfils the requirements of Annex III and should examine all the data generated by the EMS, as necessary, to ensure it is represented in a fair and balanced way in the Environmental Statement.
- **Verifying the Environmental Statement and environmental performance:** In order to attain EMAS registration the Environmental Statement must be independently validated. This process will check that the statement meets the requirements of Annex III, "Environmental Statement" (EMAS) and is publicly available.

4.2.2 Modifications to EN ISO 14001 to meet EMAS requirements

- **Environmental Policy:** The International Standard ISO 14001 includes a commitment, but not a provision, to comply with relevant environmental legislation. The organization must strengthen its statement of commitment, included in its Environmental Policy, to make provision for regulatory compliance.
- Regarding "Continuous Improvement" it should be noted that if more than one site is registered under EMAS then Continuous Improvement must be demonstrated on a site by site basis.
- **Planning:** The EMAS Regulation has very specific requirements on the type of Environmental Aspects that must be addressed, while the International Standard ISO 14001 is less prescriptive in this area. The organization should ensure that in identifying its Environmental Aspects in the planning stage of the International Standard ISO 14001, it has addressed all those items listed in Annex VI, "Environmental Aspects" (EMAS) that is applicable to the organization. The organization should also ensure that all the elements of the initial Environmental Review, detailed in Annex VII, "Environmental Review" (EMAS), have been considered and incorporated where necessary in the International Standard ISO 14001 process. Although many companies with ISO 14001 may keep registers of identified environmental effects and relevant legislation, it should be noted that under

EMAS this is mandatory. It is possible that the areas and the scope covered by ISO 14001 and EMAS may be different. The organization should take steps to ensure that the scope to be covered by the EMAS registration is covered by the International Standard ISO 14001 certificate.

- **Implementation:** One of the requirements of EMAS is the active participation of employees in the "Environmental Improvement Program". This may be achieved in a variety of ways, for example an environmental committee, suggestion book or environmental representatives.
- The organization should also take steps to ensure that any suppliers and contractors used also comply with the organization's Environmental Policy.
- **Checking and corrective action:** Since the frequency of the audit cycle is not specified in the International Standard ISO 14001 it is necessary for the organization to check that the frequency of the audit cycle is in compliance with Annex II, "Requirements concerning Internal Environmental Audit" (EMAS) and takes place at intervals of no longer than 3 years. In addition to the EMS being audited, the environmental performance of the organization must also be addressed annually to demonstrate Continuous Improvement.
- **Certification of EN ISO 14001:** In order to comply with the requirements of EMAS, the ISO 14001 certificate must be issued under one of the accreditation procedures recognized by the European Commission. The emergence of the International Standard ISO 14001 has helped EMAS in terms of raising general awareness of Environmental Management schemes. The two systems are complementary but EMAS is more rigorous in some areas. EMAS continues to be seen as more prestigious than International Standard ISO 14001 in many Member States.

5 EMS: INTEGRATION WITH OTHER MANAGEMENT SYSTEM.

The international standards on Environmental Management have as purpose to provide to the organizations the elements of an efficient EMS that can be integrated with other management requirements.

5.1 Integration with the OHSAS 18001:1999 Occupational Health & Safety Standard and with the ISO 9001:2000 International Standard

Clause	OHSAS 18001:1999	Clause	ISO 14001:2004	Clause	ISO 9001:2000
----------	----------		Introduction	0	Introduction
				0.1	General
				0.2	Process approach
				0.3	Relationship with ISO 9004
				0.4	Compatibility with other management systems
1	Scope	1	Scope	1	Scope
				1.1	General
				1.2	Application
2	Reference publications	2	Normative reference	2	Normative reference
3	Definitions	3	Terms and definitions	3	Terms and definitions
4.1	General requirement	4.1	General requirements	4.1	General requirement
4.2	OHSAS Policy	4.2	Environmental Policy	5.1	Management commitment
				5.3	Quality policy
				8.5.1	Continuous Improvement
4.3	Planning	4.3	Planning	5.4	Planning

Clause	OHSAS 18001:1999	Clause	ISO 14001:2004	Clause	ISO 9001:2000
4.3.1	Planning for hazard identification, risk assessment and risk control	4.3.1	Environmental Aspects	5.2	Customer focus
				7.2.1	Determination of requirements related to the product
				7.2.2	Review of requirements related to the product
4.3.2	Legal and Other Requirements	4.3.2	Legal and Other Requirements	5.2	Customer focus
				7.2.1	Determination of requirements related to the product
				7.2.2	Review of requirements related to the product
4.3.3	Objectives	4.3.3	Objectives, targets and Programme (s)	5.4.1	Quality objectives
4.3.4	OHSAS management programme	4.3.4	Environmental Management programme	5.4.2	Quality management system planning
				8.5.1	Continuous Improvement
4.4.	Implementation and operation	4.4	Implementation and operation	7	Product realization
4.4.1	Structure and responsibility	4.4.1	Resources, roles, responsibility and authority	5.1	Management commitment
				5.5.1	Responsibility and authority
				5.5.2	Management representative
				6.1	Provision of resources
				6.3	Infrastructure
4.4.2	Training, awareness and competence	4.4.2	Competence, Training and Awareness	6.2.1	Human resources
				6.2.2	Competence, awareness and training

Clause	OHSAS 18001:1999	Clause	ISO 14001:2004	Clause	ISO 9001:2000
4.4.3	Consultation and communication	4.4.3	Communication	5.5.3	Internal communication
				7.2.3	Customer communication
4.4.4	Documentation	4.4.4	Documentation	4.2.1	General (Documentation requirements)
4.4.5	Document and data control	4.4.5	Control of documents	4.2.3	Control of documents
4.4.6	Operational Control	4.4.6	Operational Control	7.1	Planning of product realization
				7.2.1	Determination of requirements related to the product
				7.2.2	Review of requirements related to the product
				7.3.1.	(*) D&D planning
				7.3.2	(*) D&D inputs
				7.3.3	(*) D&D outputs
				7.3.4	(*) D&D review
				7.3.5	(*) D&D verification
				7.3.6	(*) D&D validation
				7.3.7	Control of design and development changes
				7.4.1	Purchasing process
				7.4.2	Purchasing information
				7.4.3	Verification of purchased product
				7.5.1	Control of production and service provision

(*) D&D: Design and Development

Clause	OHSAS 18001:1999	Clause	ISO 14001:2004	Clause	ISO 9001:2000
4.4.6	Operational Control	4.4.6	Operational Control	7.5.2	Validation of processes for production and service provision
				7.5.5	Preservation of product
4.4.7	Emergency Preparedness and Response	4.4.7	Emergency Preparedness and Response	8.3	Control of nonconforming product
4.5	Checking and corrective action	4.5	Checking	8	Measurement, analysis and improvement
4.5.1	Performance measurement and monitoring	4.5.1	Monitoring and measurement	7.6	Control of monitoring and measuring devices.
				8.1	General
				8.2.3	Monitoring and measurement of processes
				8.2.4	Monitoring and measurement of product
				8.4	Analysis of data
----------	----------	4.5.2	Evaluation of compliance	8.2.3	Monitoring and measurement of processes
				8.2.4	Monitoring and measurement of product
4.5.2	Accidents, incidents, Non-conformance and corrective and preventive action	4.5.3	Non-conformity, corrective action and preventive action	8.3	Control of nonconforming product
				8.4	Analysis of data
				8.5.2	Corrective action
				8.5.3	Preventive action
4.5.3	Records and records management	4.5.4	Control of records	4.2.4	Control of records
4.5.4	Audit	4.5.5	Internal audit	8.2.2	Internal audit

Clause	OHSAS 18001	Clause	ISO 14001:2004	Clause	ISO 9001:2000
4.6	Management Review	4.6	Management Review	5.1	Management commitment
				5.6	Management Review
				5.6.1	General
				5.6.2	Review input
				5.6.3	Review output
				8.5.1	Continuous Improvement

5.2 Integration with the ISO/TR 14062:2002 Environmental Management, Integrating Environmental Aspects into product design and development.

The ISO/TR 14062 is a guide on how to integrate Environmental Aspects into product design and development. Strategic and business thinking is necessary for its application: first of all, integration has to be performed on the existing company specific framework of management and product development; secondly, ISO/TR 14062 covers, in particular, the addition of Environmental Aspects and tools for the framework. However, many other influences, like social acceptance or competition, have also to be taken into consideration. Thirdly, product systems are often very complex and interlinked. Tools for the description of such complex systems exist, but for a design and development engineer, there is a missing link to the level of his needs for detailing his product.

Today, most companies have Management Systems or at least organization charts and product development schemes. The International Standard ISO 14001 (EMS) is traditionally focused on product production. The International Standard ISO 9001 (Quality Management System) is usually integrating all relevant aspects from product development until the product is supplied to the customer. Many companies include both systems in one handbook.

ISO/TR 14062 describes the processes, tools, modifications, and the reviews that can easily be transferred to each of the existing Management Systems: this includes changes of existing management processes or the establishment of new processes like the take back process, environmental analysis and evaluation, documentation of environmental information, a Life Cycle thinking, Stakeholder involvement approach, etc. Most of these processes are missing, completely or partly, in both aforementioned Management Systems and have to be described individually. Customer satisfaction and environmental improvements have also to be brought together. This integration of management systems should be reflected by the integration of tools.

In Spain, for example, the new Spanish Standard UNE 150301 establishes the requirements of an EMS of the process of design and development of the products and/or services of an organisation combining Ecodesign and EMS.

6 ADVANTAGES OF THE ESTABLISHMENT OF AN EMS IN A WWTP

An EMS is a management tool that permits to make decisions about the establishment of measures that allow to achieve self-control of the real and potential Environmental Impacts of the WWTP processing.

Subsequently, a few (but important) argument in favour of its incorporation to the general management of the wastewater treatment plant are described:

- One of the objectives of the EMS is the optimisation of the resources utilization.
- An EMS conducts to a greater knowledge, improvement and control of the activities, products and services developed by the organization, what reverts in an increase of the efficiency.
- Since the environmental protection constitutes an important social theme, the EMS can serve as a tool to motivate the employees to participate in the improvements of the organization and to involve them in obtaining satisfactory results.
- The environment benefits achieved can help to improve the image of the organization and the recognition of the public opinion.
- An EMS enables to an organization to identify and to evaluate its Environmental Impacts, to compare them with the legal requirements. This allow to anticipate to the market demands, achieving savings and reducing costs. This is based on the principles of the Continuous Improvement.
- And above all, an EMS contributes to establish the bases of an effective Management System inside the organization.

Every EMS is characterized by the execution of routine evaluations of the Environmental Aspects and by the assumption of corporate commitments about:

- The fulfilment of the laws and applicable regulations.
- The implementation of actions that conduct to the Continuous Improvement of the environmental performance.

An effective EMS should permit:

- To establish an appropriate Environmental Policy for each organization.
- To identify the Environmental Aspects arisen of the activities, products or services, past, existing or planned, to determine the significant Environmental Impacts.
- To identify the corresponding Legal and Other Requirements.
- To identify priorities and to set appropriate environmental Objectives & Targets.
- To facilitate the planning, the control, the monitoring, the corrective actions, the audits and Management Review to assure that complies the Environmental Policy, and that the EMS is appropriate.
- To adapt the different organizations to the circumstances changes.

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(*) Due to the technical characteristics of this document, some fragments have been reproduced literally.