Toolkit for Wastewater Utilities

Environmental Management Systems

February 2007

This document is based upon the EMS Toolkit for Wastewater Utilities, available at www.peercenter.net/toolkit. The Toolkit was developed with two audiences in mind:

- Utility managers looking to make an informed decision about "**why**" to implement an EMS based upon the best available information and experiences from other utilities that have successfully implemented; and,

- Utility managers and staff that have decided to implement an EMS and are looking for state-of-the-art guidance and advice on "**how**" to implement.

All of these tools were developed in partnership with U.S. EPA's Office of Wastewater Management as well as wastewater managers and practitioners with experience in EMS implementation to ensure the unique applicability to the operating environment of public wastewater utilities. This Toolkit includes the following documents:

EMS Compendium for Wastewater Managers (*Pages 3-14*): A concise "business case" for EMS implementation based upon EMS practitioner input, highlighting drivers, benefits, support and resources available to utility managers making the decision to implement an EMS.

EMS Case Studies in the Public Water Sector (*Pages 15-88*): A compendium of real world EMS experiences from the public water sector, highlighting the drivers, goals, overall approach, and results from the unique EMS experiences of five utilities.

EMS Handbook for Wastewater Utilities (*Pages 89-527*): This step-by-step guide covers all the elements of EMS implementation, including tracking and evaluating regulatory requirements, prioritizing environmental impacts and associated activities, sustaining your utility processes through operational controls and measuring your environmental performance, to prioritizing limited resources.

EMS Aspects Identification and Prioritization Workbook (*Pages 528-578*): A complementary workbook for analyzing and prioritizing potential environmental impacts, one of the most difficult elements of building an EMS. The Workbook includes step-by-step lessons and exercises, along with experiences and examples from several wastewater organizations.

For more information about the U.S. EPA supported PEER Center programs, please contact:

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Reducing Costs, Optimizing Performance:

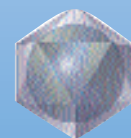# An Environmental Management System (EMS) Compendium for Wastewater Utility Managers

Do

Plan

Act

Check

August 2006

"We searched for viable solutions to overcome several environmental challenges confronting us. For example, our discharge permit was up for renewal, the Spring Chinook salmon in the Willamette River was listed as a threatened species under the Endangered Species Act, and the City Council passed a resolution to enforce sustainability of city operations. We were also exploring approaches to better organize the strategic management of our operations. We chose EMS to improve performance and efficiency, as well as to confront the challenges we faced."

Peter Ruffier
Wastewater Division Director
Eugene, Oregon

A. Executive Summary

Increased bond ratings

"Our organization's achievement to an EMS based on ISO 14001, has provided a level of confidence to credit rating agencies that the utility is being run as a business and as efficiently as possible. When we went to the market for a bond needed to rehabilitate decaying tunnels, this helped our utility to receive a favorable credit rating. The EMS has contributed to an improvement in our bond ratings and has allowed Charleston Water to save between $17,000 to $170,000 annually on a $170 million bond."

John B. Cook
Assistant General Manager/Engineer
Charleston Water

Managing Changing Business and Operational Conditions

"Based on Fitch's findings, sound and institutionalized management practices can often endure the most extreme stresses from economic downturns or unexpected system demand. Conversely, the lack thereof can exacerbate weakening conditions."

Fitch Ratings Revenue Criteria Report

Improved public recognition and leadership

"In the past, if anyone mentioned odor complaints the comments would have been dismissed with little attention. Since the EMS process and associated organizational changes, employees react much differently because they understand the importance of addressing community issues".

Andy Kricun
Deputy Executive Director
Camden County Municipal Utilities Authority
(CCMUA)

Water and wastewater utility managers across the nation have been utilizing Environmental Management Systems (EMS) to:

- Reduce operating costs
- Improve environmental performance
- Reduce vulnerability to environmental violations, fines and penalties
- Capture institutional knowledge to sustain successes

In August 2004, a group of these utility managers, having successfully implemented EMSs at their facilities, described the manner in which these types of results were achieved through development of a step by step *EMS Handbook for Wastewater Utilities* (http://www.peercenter.net/sector/wastewater/), completed in August 2004. This *EMS Compendium for Wastewater Utility Managers* was created as a direct follow up to the EMS *Handbook* to make the business case for top management by demonstrating, with detail and specificity, why implementing an EMS can result in significant benefits that far outweigh the cost and effort of implementation.
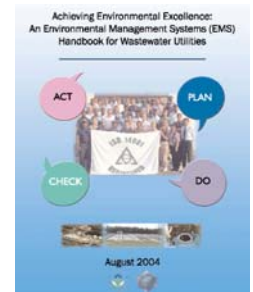
As you learn more about the benefits of EMS implementation, it is very likely that you will also be pleasantly surprised to see that your utility already has a number of the required EMS management elements and programs in place. An EMS does not reinvent the wheel, but rather creates a systematic framework to clearly identify an organization's most important goals and then better organize and enhance the management programs and corporate strategies that you already have in place to best meet those goals.

As fellow utility managers and Steering Committee members (Section L) directly involved with the development of this *Compendium*, we appreciate the opportunity to pass on what we have learned on the benefits of EMS, which is based on the direct experience of top management professionals in the wastewater industry. We hope that review of these experiences will encourage you to develop your own EMS and attain the same important benefits that the managers who helped develop this *Compendium* have already realized. Please use this resource to help your utility reach its most important organizational goals.

B. Why Develop an EMS for Your Wastewater Utility?

While the decision to develop and implement an EMS entails a commitment of time and monetary resources, EMS implementation experiences from wastewater utilities and other local government organizations have shown consistent short-term and long-term returns on investment. In addition to economic savings, wastewater facilities have realized a wide-range of other benefits, including improved relationships with regulators, neighbors and other external stakeholders, better public perception and image, and improved operational efficiency and control. As a manager, you should consider the following questions to assess whether an EMS is appropriate for your organization:

- Would you like to reduce inefficiencies and thereby reduce operations and maintenance costs?
- Would you like to manage risks and liabilities more effectively?
- Does your organization have a reliable and effective process for monitoring and complying with laws and regulations?
- Do you feel that your organization can make other environmental improvements?
- Would you like your wastewater utility to be a leader in environmental stewardship?
- Are you concerned about retirement, staff turnover and undocumented operational knowledge?
- Are you concerned about public image?
- Would improved communication and teamwork be useful in daily operations?
- Would you welcome more input from frontline staff on potential improvements?

If you answered "yes" to any of these questions, an EMS may provide tangible benefits to your organization. Wastewater utilities based their decisions to develop and implement an EMS on the issues presented above and they have realized positive benefits and returns on investment from pursuing EMS goals.

An EMS offers your wastewater utility the ability to change from a culture of reaction to one of proactive decision-making, where sound, operational practices are institutionalized and your employees are foreseeing opportunities for environmental and operational improvements.

Benefits from EMS Implementation

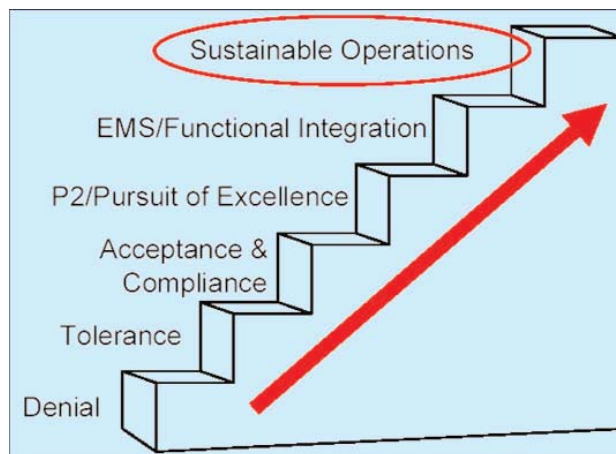### Improved Public Image and Leadership
Implementation of a community notification system provided the neighboring community with 24-hour telephone access for reporting odor concerns. The hotline provides real time community input to Camden County Municipal Utilities Authority's (CCMUA's) EMS. (Camden County, NJ)

In 1999, the City of San Diego became the first municipal wastewater treatment facility in the U.S. to certify to the ISO 14001 Standard. (San Diego, CA)

Reduced Rates
CCMUA customers received a 6% lower rate than in 1996, with three separate rate reductions in 10 years. (Camden County, NJ)

By establishing Fuel Reduction Teams for the Water and Wastewater Plants and by implementing Route-Smart Software as part of an EMS improvement program, Charleston Water is saving $48,000 per year on fuel costs. (Charleston, SC)

Sustainable Operations
EMS/Functional Integration
P2/Pursuit of Excellence
Acceptance & Compliance
Tolerance
Denial

2

What an EMS is and What an EMS is Not

An EMS
Establishes the internal framework that must be in place (e.g., policies, procedures, training, records) to have a proactive system to manage environmental issues.

Does not replace or act as a substitute for any applicable environmental legal requirement.

An EMS
Defines the critical elements and operational controls that must be in place and followed to control the impact an organization has on the environment.

Does not tell an organization how or what to manage. That is up to the organization.

An EMS
Can be tailored to all types of organizations and facilities: large and small companies and pubic organizations such as municipalities, federal facilities and wastewater treatment plants.

Is not designed for a particular kind or size of operation.

EMS Environmental Policy Commitments:
- Continual Improvement
- Pollution Prevention
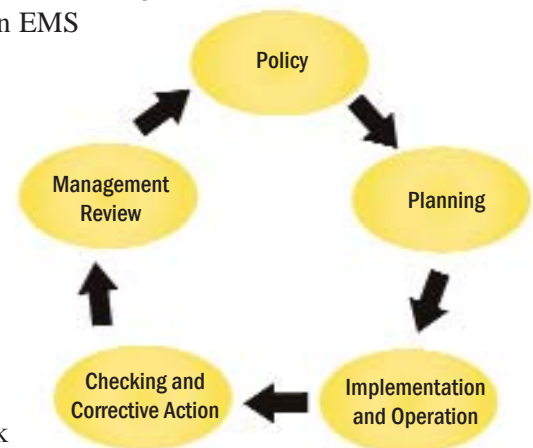- Compliance with Relevant Laws and Regulations

C. What is an EMS?

What is an Environmental Management System (EMS)?

A management system is a set of tools, policies and procedures, training and expertise that can be used to create programs and plans tailored to meet the resources and goals of an organization. An EMS is built around the framework of "plan, do, check, act" that uses a standard process to identify organizational goals, implement them, determine progress, and make improvements to ensure that environmental considerations are fully integrated into the organization's mission and operations. Key elements of an EMS include:

- Defining roles and responsibilities
- Identifying and prioritizing environmental impacts
- Setting measurable objectives and targets
- Verifying and establishing operational controls
- Monitoring and measuring activities and progress
- Aiming for continual improvement as part of a review (feedback) cycle

An EMS provides a systematic way to review and improve operations for better organizational control and environmental performance. It can enable an organization to: 1) Reduce operating costs; 2) Improve environmental performance; 3) Reduce vulnerability to environmental violations, fines and penalties; and 4) Capture institutional knowledge and plan for succession. Because an EMS provides a continual improvement management framework, it can be adapted to particular industries through programs such as the National Biosolids Partnership (NBP) and Responsible Care[sm], helping to transform an organization from reactive to proactive (eliminating problems before they occur). Organizations with an EMS no longer apply quick fixes to issues, but provide a systematic ("find, fix, and prevent") approach to managing environmental responsibilities through strategic planning and decision making.

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D. How Can an EMS Benefit You as a Utility Manager?

An EMS (Plan, Do, Check, Act) Approach Adds Value by

- Focusing on environmental management practices rather than only on regulated activities.

- Investing in continual systems approaches leading to effective investments in human and technical resources.

- Making use of a strong check and act structure for business and environmental priorities.

- Utilizing a continual improvement framework to achieve performance across multiple areas.

- Supporting an organizational culture that embraces change and has a forward focus.

"Change is good...but you go first!"

Wastewater utilities with an EMS have found it to be a valuable tool that provides a structure for strategic goal setting, improved decision making and efficient resource allocation across management priorities, balancing the management of operations throughout the value chain. A management system framework also provides an organization the ability to adapt more effectively in response to changing circumstances, allowing for management flexibility and incorporating change management into day-to-day operations. Missions, budgets, and priorities will continue to change, but the basic principles and structure of a management systems approach will help your utility deal with change through a framework of plan, do, check and act.

How Can an EMS help Manage Change?

As you move forward with your EMS, you'll realize that the challenge is not going to be with technical issues, but rather with organizational change. Most organizations don't like change and are comfortable with the status quo.

Continual improvement management systems like an EMS require change management to ensure the system remains important and effective as operations and processes change and evolve. Examples of changes that typically require a management system response include: additions/deletions to a procedure or process and changes in the general administrative operating environment of your organization (e.g., internal reorganizations, capacity reductions, shifts in public acceptance, changes in roles and responsibilities, retirements).

Demographic studies show that turnover from retirement in public agencies could be as high as 50% over the next 10 years. An EMS can be a valuable tool to managing employee succession concerns by providing a utility with a continual planning framework that captures institutional knowledge before experienced employees retire.

Managing change is an important factor in EMS implementation and your entire wastewater utility leadership must be involved and communicate the EMS as a priority. Top management and department managers facilitate change by communicating clearly and frequently and through their involvement early on in EMS awareness activities.

4

Key Message: Senior Management Roles and Responsibilities

Every organization implementing an EMS has come to the same conclusion about management support-visibility, commitment, and involvement are the #1 keys to success. Be sure your EMS plans include regular and frequent dialogue with management.

E. What's My Role in Implementing an EMS?

As a senior manager, your role includes having a good understanding of what's involved in EMS implementation, including financial obligations and committing additional time for staff, including EMS Teams (as necessary) and designating an EMS Representative, a champion and identified leader of your utility's EMS who has the responsibility and management authority for implementing the EMS from start to finish.

An EMS is not a program that one person can put in place. In fact, an effective management system will involve every employee-becoming business as usual.

For more in depth information on EMS implementation in your industry, review *An Environmental Management Systems (EMS) Handbook for Wastewater Utilities*, available at: *www.peercenter.net.*

If wastewater senior and mid-level managers do not understand the potential benefits of an EMS, they probably will not have the incentive to follow through with implementation. During your preliminary discussions about the EMS, you'll want to clarify management's specific goals for the EMS at your facility. You'll also want to confirm that managers understand the EMS implementation strategy and schedule you are using, the estimated direct labor commitment involved, and when, how, and what to communicate to employees on a regular basis. As a senior manager, make sure you are direct and delegate when necessary to communicate the importance of the EMS.

When senior managers maintain interest and commitment, employees also stay focused. There will be some frustrations as implementation progresses and previously unforeseen issues arise. Managers should accept these as opportunities to facilitate and focus on continual improvement to address existing issues and prevent future hurdles.

Remember that organizational attitude reflects leadership!

Key Management Roles and Responsibilities

- Be an active participant and be consistently involved.

- Be visible and positive about the message (e.g., "walk the talk" by your words and actions).

- Be up front and honest about the effort needed for successful implementation.

- Provide for resources (financial, staff).

- Support for a facility EMS Representative to champion and drive your EMS.

- Provide moral support, encourage your EMS teams, and create a leadership environment that ensures success. The staff should feel that you are in it with them and committed to success.

- Promote EMS goals and provide a strategic vision.

- Share performance results with the workforce.

- Communicate with external stakeholders (e.g., citizens, elected officials, regulators) to share experiences and to learn from others.

- Celebrate EMS achievements and recognize environmental improvements.

Your wastewater utility already has programs and initiatives in place to manage and reduce its impact on the environment. Some of these could include:

■ Compliance programs (e.g., pretreatment, Capacity, Management, Operations, and Maintenance (CMOM), hazardous waste regulations, stormwater, fuel storage)

■ Pollution prevention programs and sustainability initiatives (e.g., improving energy and resource efficiency, addressing product stewardship responsibilities, alternative fuels)

■ Other management systems/programs (e.g., National Biosolids Partnership, Six Sigma, QualServe)

F. Does an EMS Integrate With and Build on Other Wastewater Utility Management Programs?

Yes. Wastewater utilities that currently have other management systems and programs (e.g., Asset Management, QualServe, Six Sigma, Biosolids EMS) in place have effectively integrated an EMS in their organizations. Most wastewater utilities have business planning tools, policies, plans and standard operating procedures, training programs and other similar operating and administrative processes. An EMS approach can help integrate your current management programs and systems, as well as institutionalize your operating and business plans and procedures by providing an umbrella of continual improvement in a framework of plan, do, check and act to manage, measure, review, and reduce environmental impacts. For example, wastewater utilities can use their EMS to integrate with asset management programs because an EMS is designed to reduce the environmental impacts of various activities, including the impacts caused by aging or inadequate capital assets.

Keep in mind that in many cases, managing through an EMS is not a drastic change from the way you are conducting business now. An EMS is a framework rather than a set of instructions and activities. By providing a continual check and improvement framework, a management systems (EMS) approach allows an organization to focus, build on what you would like to do better and balance organizational initiatives and programs already in place, including health and safety, quality, asset management and financial and environmental performance initiatives.

Remember, an EMS should not be developed in a vacuum—it should be coordinated or integrated with other policies, plans, strategies, and budgets. For example, if you are planning a major expansion in one of your wastewater treatment operations, then it makes sense to look at the possible environmental impacts associated with the operational expansion at the beginning, in the planning stage.

Typical Benefits of Integrating an EMS with Wastewater Utility Management Programs

■ Leverage existing infrastructure

■ Continual improvement in strategically targeted areas

■ Enhance operational consistency and reliability

■ Improve teamwork, coordination and employeeawareness

■ Leverage integration of multiple management programs and initiatives

■ Coordinate resources (human and financial)

■ Streamline communications

■ Realize environmental improvements

Examples of Management Systems/Programs at Wastewater Utilities

Camden County, NJ
ISO 14001, NBP, CMOM (in development)
Andy Kricun; 856-541-3700

Charleston, SC
ISO 14001, CMOM, Partnership for Safe Water
Rick Bickerstaff; 843-308-8201

Eugene, OR
ISO 14001, APWA Accreditation, Balanced Scorecard
Donna Adams; 541-682-8613

Kent County, DE
ISO 14001, NBP, OHSAS 18001
Jim Newton; 302-335-6000

Madison, WI
NBP EMS, Strategic Planning Initiatives, Asset Management
Jon Schellfeffer; 608-222-1201

Oakland County, MI
ISO 14001, ISO 9001
Sherri Gee; 248-858-0108

Orange County, CA
NBP EMS, Asset Management, Unifying Strategies
Doug Stewart; 714-962-2411

San Diego, CA
ISO 14001, Strategic Business Plan, Bid-to-Goal, Pay-to-Performance
Chris Toth; 858-654-4161

Santa Clara, CA
ISO 14001, Asset Management, Balanced Scorecard/Strategic Planning, Malcolm Baldrige National Quality Program
Stan Williams; 408-265-2600

What are the Benefits of Integrating an EMS with your Current Management Programs?

Wastewater utilities that integrate EMS into their current management programs have realized significant benefits, such as reduced operational costs, improved environmental performance, streamlined operations and decision-making, integrated employee training, versatility in the ability to address a variety of performance needs, and a more efficient use of resources, thereby creating efficiencies. In addition, alignment of wastewater management systems and programs under a continual improvement framework ensures that resource allocations are not in competition, but are coordinated to meet overall management goals.

The integration of an EMS with wastewater utility management programs and initiatives can bring a number of benefits and alignment/leveraging opportunities. Examples include:

Strategic Business Planning: Operational and Financial Efficiencies
The Eugene, Oregon Wastewater Division increased transparency of their operations and capital budgeting process by integrating EMS and Balanced Scorecard (BSC). Performance measures are now being identified for each program area and are subsequently fed into the annual budgeting process. Eugene has been able to leverage the existing management infrastructure of the EMS to support the BSC. The development of duplicate document control systems, for example, has been avoided. In addition, the same measuring and monitoring system will be used to track progress on all objectives and targets derived from the EMS and BSC. (http://www.eugene-or.gov/portal/server.pt)

Improvement Plans
The Santa Clara Valley Water District, CA combined their asset management program with an EMS to provide a way to balance and prioritize competing objectives. (http://www.valleywater.org/)

Customer Responsiveness and Recognition
The Western Carolina Regional Sewer Authority found that by integrating and combining their NBP EMS and CMOM efforts, its public education program more effectively informs the public of all its programs. (http://www.wcrsa.org/)

As you integrate EMS with your current systems and programs, consider the following questions:

- Are there business or management reasons to keep the programs and systems separate?

- Do you have the resources (human and financial) to have two or more separate management programs/systems?

- What is the optimal approach from a strategic and operational standpoint?

- Which approach is best suited for the facility's change and growth?

From: EMS Implementation Guides for EPA Sectors (Appendix B-Integration of Environmental Management Systems and Quality Management Systems)

Is an EMS applicable to both small and large organizations?

Yes. An EMS can bring significant benefits to any organization, of any size, that wants to improve its environmental performance and/or improve its cost effectiveness. EMSs are being adopted by organizations of all sizes and types, including small and large organizations and local governments. An EMS should become part of the organization's overall management structure; including strategic planning, roles and responsibilities, performance measurement and implementation of overarching policies as a part of an organization's short- and long-term objectives. Therefore, small and large and public or private wastewater utilities will have an EMS with the same elements and framework, but the level of detail and level of documentation will reflect the nature and scale of each utility's or department's activities. For example, the San Diego Operations and Maintenance Division, which manages approximately 180 million gallons of water a day (MGD), and Gastonia, North Carolina's Wastewater Facility, managing approximately 22 MGD, have very similar EMS procedures and policies in place for their respective EMSs because the framework or structure of a plan, do, check, and act management systems approach remains the same.

Benefits from EMS Implementation

Reduced Environmental Impact

Kent County Wastewater switched from Fuel Oil No. 2 to B20 biodiesel as a fuel source for its emergency generators and is considering a switch to B20 for all of its diesel fleet and potentially as the primary fuel for biosolids production. Expected to reduce air pollution by 5 million pounds of CO_2/year; hydrocarbon emissions by 20%; carbon monoxide by 12%; and particulates by 12%. (Kent County, DE)

We greatly exceeded our target and actually reduced paper use by 50% total. We reduced janitorial paper use by 48%, and office paper use by 37%. (Eugene, OR)

Employee Awareness and Communication

Employees have enthusiastically supported the EMS, which has helped make their jobs easier and has increased their awareness of how their actions, and the actions of those they serve, impact the environment. This is important, as they are ambassadors to the public, our rate payers. (Oakland County, MI)

Our planning has improved considerably. Prior to EMS establishment, no formal, consistent structure was available for planning. Also, our planning is much more focused, with drivers in place, and our associates (employees) have a better understanding of the reasons behind the planning initiatives. Additionally, knowledge of our company's impact on the environment has been heightened. (Charleston, SC)

"CCMUA's EMS goals correspond completely with the organization's overall goals; therefore, it is nearly impossible to differentiate general operations and maintenance costs from direct labor resources for an EMS. CCMUA views EMS as a means to improve progress towards meeting organizational goals, so the labor resources used for EMS are "sunk" costs (i.e., would expend these resources regardless), not a marginal cost."

Andy Kricun
Deputy Executive Director
CCMUA
Camden, New Jersey

G. What is the Typical Cost of an EMS?

The majority of time committed during EMS implementation is the responsibility of the Environmental Management Representative and the EMS Core Team. Based on data tracked from 8 wastewater and drinking water utilities, average resource commitments included:

- Total Staff Time to Implement (Project Start to 1st Management Review): 2,900 hours;
- Time (from Project Start to 1st Management Review) to Implement an EMS: 24 months; and
- Staff Time to Maintain an EMS after Initial Implementation: 10-12 hours/year for each employee.

For more information, visit:
www.peercenter.net/sector/wastewater/

The main cost of an EMS is the investment of direct employee labor time and consultant time that an organization spends in order to establish the EMS. However, EMS programs and goals typically correspond directly with a utility's overall business and operational programs and goals and therefore, EMS costs are largely part of what you are already doing at your utility. In addition, many utilities have found that EMS costs have been offset by the subsequent time efficiencies and financial cost savings realized through EMS implementation. In the sidebars throughout this Compendium, you can read about the EMS benefits achieved by wastewater utilities that have implemented an EMS, including increased operational efficiencies and cost savings.

Developing and maintaining an EMS does entail certain costs. However, wastewater utilities that have implemented an EMS have seen significant cost savings that often far exceed the costs of the EMS. The following table summarizes the costs and savings from several utilities.

Wastewater Organization	Total Costs to Implement an EMS (In-House Labor, Consulting, Travel, Materials)	EMS as a % of O&M Budget*	Wastewater Average Staff Time in Hours (EMS Project Start to 1st Management Review)	Example of EMS Cost Savings
Natick, Massachusetts Springvale Water (8 MGD)	$50,000	4.0%	1,000	$40,000 avoided annually by documenting EMS procedures
Charleston, South Carolina Wastewater (40 - 74 MGD)	$57,000	0.10%	1,675	Annual operating costs reduced by $175,000
Kent County, Delaware Wastewater (16 MGD)	$140,000	2.00%	2,985	85% reduction in SSOs; annual indirect cost savings of $20,000
Lowell, Massachusetts Regional Wastewater (32 MGD)	$42,000	0.64%	1,424	Annual cost savings of $180,000 through recycling and energy reduction efforts
Camden, New Jersey CCMUA (80 MGD)	$60,000	3.00%	2,000	$5M reduced in annual operations costs

* Based on publically available operations and maintenance annual budgets (2005-2006)

"EMS has become so ingrained in our business and what we do that it is not seen as a separate system, but as part of normal operations."

John B. Cook
Assistant General Manager/Engineer
Charleston Water
Charleston, South Carolina

H. How Can I Get Started Developing an EMS and Where Can I Find More Information?

There are a number of key organizations and resources that can help you as a wastewater utility manager get information on and develop an effective EMS.

Organizational support is available through the Public Entity EMS Resource (PEER) Center (www.peercenter.net) and 11 EMS Local Resource Centers (www.peercenter.net/whocanhelp/lrc.cfm) around the country. These organizations have been designated to assist local governments, including wastewater utilities, understand and develop EMSs that can help you meet your organizational and environmental goals. In addition, the following references and resources are available for your review.

1. An Environmental Management Systems (EMS) Handbook for Wastewater Utilities: Achieving Environmental Excellence, August 2004 (www.peercenter.net/sector/wastewater)

2. EMS Aspects Identification and Prioritization Workbook, May 2006 (www.peercenter.net/sector/wastewater)

3. EMS Case Studies in the Public Water Sector (http://www.peercenter.net/sector/wastewater/CaseStudies.cfm)

4. Managing for Excellence: Analysis of Water and Wastewater Utility Management Systems, August 2005

5. Continual Improvement in Utility Management: A Framework for Integration, August 2004

6. Moving Towards Comprehensive Utility Management Systems: Report of the Environmental Management Systems (EMS) for Public Utilities Integration Project, September 2002

7. Meeting with Utility Leaders on Sustainable Management: Meeting Summary, July 27-28, 2005

8. Environmental Management Systems As A Cost-Effective Alternative to Privatization, Presentation by Andrew Kricun, Deputy Executive Director, Camden County Municipal Utilities Authority and Tom Pedersen, Vice President, Camp Dresser & McKee Inc.

Benefits from EMS Implementation

Improved Compliance
The legal and other requirement elements of an EMS allowed Natick to consolidate their requirements into a single list, develop a procedure for identifying and monitoring applicable requirements, delegate roles and responsibilities, and ensure that requisite personnel are provided with knowledge and training. Collectively, this has provided Natick with enhanced confidence that they are operating within statutory and regulatory requirements. (Natick, MA)

Regularly discharging effluent that ranges from 12-18ppm, having struggled in the late 1990's to meet 30 ppm limits on a consistent basis. (Camden County, NJ)

Employee Awareness and Communication
The actual planning and implementation of an EMS has resulted in section leaders within the WWCD communicating between sections in a more organized and frequent manner. (San Diego, CA)

Employees have enthusiastically supported the EMS, which has helped make their jobs easier and has increased their awareness of how their actions, and the actions of those they serve, impact the environment. This is important, as they are ambassadors to the public, our rate payers. (Oakland County, MI)

Benefits from EMS Implementation

Reduced Costs
Expect to reduce electric costs by $200,000 - $300,000 per year through installing a renewable energy system and/or an on-site bio-gas facility. (Kent County, DE)

25% reduction in operations and maintenance costs (includes treatment plant and collection system) from $21.2 million in 1996 to $16 million in 2000. (Camden County, NY)

Increased Operational Consistency and Efficiency
Reduction of wet weather bypasses from 24 in 1999 to 2 over the last 6 years. (Camden County, NJ)

Charleston Water's Preventive to Corrective Maintenance ratio (PM:CM) has increased by over 70% (85:75) from the industry baseline (15:25) as a result of implementing environmental improvement programs as part of their EMS, saving Charleston $52,000 per year on maintenance of operations. (Charleston, SC)

Sanitary Sewer Overflow Reductions
For 2004, an 85% reduction in SSOs from 2002 levels has occurred, including the successful roll-out of a fats, oils and grease (FOG) reduction program for food service provider. (Kent Count, DE)

The EMS process allowed us to justify a major capital expenditure targeting the reduction of inflow and infiltration. Not only does this represent a significant financial commitment, it shows that our commitment to environmental protection goes far beyond mere hype by addressing a major residential complaint. (Oakland County, MI)

II

I. Steering Committee

This EMS Compendium for Wastewater Utility Managers, supported by the U.S. EPA Office of Water in cooperation with the Global Environment and Technology Foundation (GETF), was specifically written to encourage wastewater utility managers to consider an EMS as a business management tool as they make important decisions on resource allocation and on the long-term viability of their wastewater operations. To accomplish these objectives, wastewater and local government colleagues who and other public sector managers that have successfully implemented an EMS at their utilities played a major role in developing this Compendium, serving as a Steering Committee members for this project. Their introductory comments are contained in the Executive Summary, with practical insights and experiences integrated throughout this document. The Steering Committee for this effort included the following wastewater and local government practitioners:

Bill Engel
Director
TREEO Center
Gainesville, Florida

Larry Falkin
Deputy Director of Natural Resources
Jackson County Parks & Recreation
Blue Springs, Missouri

Andy Kricun
Deputy Executive Director
CCMUA
Camden, New Jersey

Kristel Riddervold
Environmental Administrator
Public Works Department
Charlottesville, Virginia

Beth Shonts
Business Development Manager
Metro Waste Authority
Des Moines, Iowa

Chris Toth
Deputy Director
Metropolitan Wastewater Department
San Diego, California

EMS CASE STUDIES IN THE PUBLIC WATER SECTOR

Environmental Management Systems: Assisting Wastewater And Drinking Water Facilities Achieve Environmental Excellence

Case Study #1: Kent County, DE Wastewater Treatment Facility
Case Study #2: Natick, MA Springvale Water Treatment Plant
Case Study #3: Camden County, NJ Municipal Utilities Authority
Case Study #4: Oakland County, MI Drain Commissioner's Office
Case Study #5: Lowell, MA Regional Wastewater Utility

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INTRODUCTION

Water and wastewater utilities are facing unprecedented challenges in the years ahead. Increasing demands from customers, regulatory agencies, and others in the community make it more important than ever before for these utilities to use state-of-the-art management approaches like environmental management systems (EMS).

EMSs provide a structured approach for the utility to manage a full range of activities in order to improve environmental performance. EMSs also help utilities identify more efficient ways to operate and reduce unnecessary risks and costs. Finally, using an EMS can help utility managers operate with more confidence and build better relations with the communities they serve and regulatory agencies.

The following case studies are designed to help utilities understand how their colleagues have used EMSs to achieve important results. They were developed, in large part, by your colleagues in the industry and will hopefully illustrate how an EMS can help your utility operate more effectively.

An additional list of EMS resources that can help you is also provided at the end of this compendium.

KENT COUNTY DEPARTMENT OF PUBLIC WORKS
Wastewater Treatment Facility

The Kent County Department of Public Works (DPW) Wastewater Treatment Facility (KCWTF) implemented their EMS, beginning in January 2003, through simultaneous participation in two national EMS pilot projects: 1) the U.S. EPA supported Third EMS Initiative for Government Entities (www.peercenter.net); and 2) the National Biosolids Partnership (NBP) EMS Program (www.biosolids.org). The two programs offered Kent County the opportunity to integrate the wastewater facility's EMS efforts with their on-site private sector biosolids management partner K-F Environmental Technologies, Inc and leverage the technical assistance and national recognition offered through both programs.

EMS Fenceline

- Regional wastewater collection and treatment system, including maintenance and engineering support functions and private partner biosolids operations.
- 16 MGD wastewater treatment facility with land application of a Class A biosolids.
- 59 pump and lift stations and over 45 miles of force main and main sewer lines.
- 39 staff with an additional 14 engineering staff with some responsibilities related to wastewater operations.
- Operations serve 70% of the county's population.

Key Reasons for Implementing an EMS

- More efficient use of time, monetary, and natural resources.
- Model for industries within the community.
- Ability to respond to and implement new regulatory initiatives.
- Commitment to developing a positive environmental image for the County.

Current EMS Objectives and Targets
Kent County has established Environmental Management Programs to achieve their robust quantitative EMS Objectives and Targets, which currently include:

- Reduce sulfur dioxide, particulate and CO emissions by 50% from CY 2002 levels.
- Reduce electricity usage by 20% from CY 2002 levels.
- Improve safety of existing processes or switch to alternative disinfection methods.
- Reduce Sanitary Sewer Overflows by 40% from CY 2002 levels.

Top 3 Keys to Success	1. Active senior management support.
	2. Committed Core Team that understood the program and desired to see it completed.
	3. Participating in national EMS initiatives allowed Kent County to learn from prior participants, leveraging existing knowledge and expertise.

Top 3 Barriers	1. It is important not to take too long to "roll out" the program and implement the EMS. Early momentum is key.
	2. It proved more difficult than originally expected to facilitate the private-public partnership and to keep all team members on the same page and committed.
	3. Many organizational layers, internal and external, have to agree to participate in the program.
Top 3 Lessons Learned	1. It's important to undertake the project using the assistance of practitioners and experienced technical assistance providers.
	2. Active senior management involvement throughout the project, even before implementation actually begins.
	3. Interaction with team members on an almost daily basis, especially during the first stages of EMS implementation.

Resource Commitment

- 8 members on the EMS Core Team.
- 25% of time dedicated by a single Environmental Management Representative ("EMR") to serve as overall program manager or team leader for the EMS implementation.
- Bi-weekly, one hour Core Team meetings (8 team members) during the EMS development phase and quarterly meetings during the ongoing maintenance phase of the EMS.
- One complete EMS cycle (24 months) required 2,985 total person hours at a total cost of approximately $101,691 in direct labor resources, and about $40,000 in other costs including national program participation (including technical assistance), travel to workshops, and third-party certification audits.

Return on Investment – EMS Benefits

- Potential energy savings of $200,000-300,000 per year, as a result of serious consideration of installing a renewable wind energy system, an on-site bio-gas station, and/or a generator load sharing agreement.
- Effective employee succession program to contain knowledge.
- Potential reduced air pollution by 5 million pounds of carbon dioxide per year, 20% hydrocarbon emissions, 12% carbon monoxide emissions, and 12% in particulate emissions, as a result of switching to B20 biodiesel as a fuel source.
- Improved chlorine delivery system.
- 85% reduction in Sanitary Sewer Overflows.
- Improved public image and award recognition
  - 2004 NACo Achievement Award
  - 2004 Clean Water Act Pretreatment Program runner-up
  - Environmental Protection Magazine Facility of the Year

NATICK, MASSACHUSETTS
Springvale Water Treatment Plant

The Natick Department of Public Works (DPW) Springvale Water Treatment Plant implemented their EMS beginning in February 2002, through funding provided by the Massachusetts Department of Environmental Protection (DEP) Municipal Stewardship Grants program. Grants were awarded to nine municipalities and two regional organizations for projects that would promote sustainable environmental stewardship through the use of an EMS or an environmental management plan that demonstrated enhanced performance through performance measurement. Technical assistance was provided by the state DEP and the consulting firm of Woodard & Curran. The decision to implement an EMS was also in response to a November 2001 U.S. EPA Consent Agreement requiring Natick to complete a Supplemental Environmental Project.

EMS Fenceline
- Springvale Water Treatment Facilities: Treatment Plant, Pumping Facilities, Production Wells, Distribution System, and Sanitary Sewer Pumping Facilities.
- Three satellite water supply wells, two water storage tanks, 36 sewer stations, one water booster pump station, and all mechanical parts for the water distribution system.
- 26 employees operate and maintain the town's water treatment plant, water wells, and sewer pump stations on a 24-hour basis.
- Operations serve the town's population of approximately 32,000.

Key Reasons for Implementing an EMS
- Serve as a model for municipalities within the region.
- Largest chemical user in town with location near highly populated areas.
- Ability to efficiently respond to new regulatory initiatives by state DEP and Federal EPA.
- Improve image and establish a working relationship with regulators.
- Commitment to developing a positive environmental image for the Town.

Current Environmental Targets
Natick has established the following environmental targets to measure progress in meeting the Sewer and Water Division's EMS objectives for 2005:
- No spills or releases of chemicals above regulatory reporting concentrations.
- No more than five liquid/solid chemical spills or releases per year.
- Eliminate confined space in waste water pump stations by FY 2007.
- Train emergency response team to protect storm water drainage in Zone II of town drinking water wells by December 2005.
- Eliminate the use of chlorine gas as a treatment chemical at the treatment plant by December 2005.
- Maintain noise in the office space at less than 70 db by December 2005.

Top 3 Keys to Success	1. External program participation and outside technical assistance.
	2. Proven templates and the ability to leverage practitioner tools.
	3. Technical assistance consultant with EMS experience and water systems knowledge.
Top 3 Barriers	1. Finding consistent meeting times was difficult, especially with 24/7 operations.
	2. Personnel other than the EMS Program Manager had very limited upfront knowledge of the EMS process.
	3. Development of environmental management plans could have been more effective early on.
Top 3 Lessons Learned	1. EMS is about continual improvement - be realistic about what it can reasonably achieve with each cycle.
	2. You cannot implement an EMS completely from scratch without outside examples and experiences.
	3. Translate EMS jargon to your organizational culture.

Resource Commitment

- Nine members on the EMS Core Team, with Strategic Oversight Committee serving an advisory role.
- 20% of time dedicated by single Environmental Management Representative ("EMR") to serve as overall EMS program manager or team leader.
- One complete EMS cycle (Policy through Internal Audit) required approximately 1,000 total person hours at a total cost of approximately $30,000 in labor resources and $20,000 in consultant services.

Return on Investment – EMS Benefits

- Cost savings
  - Approximately $40,000 avoided because a documented EMS standard operating procedure alleviated the need for back-up equipment (regulatory requirement).
  - Increased efficiency and operational consistency has resulted in a variety of cost and waste reductions (disposal cost decreases, recycled paper as a commodity, mixed compost).
- Improved ability to meet compliance requirements.
- Improved environmental awareness, involvement, and competency of staff throughout the Division.
- Improved internal and external communication of environmental issues.
- Recognition for leadership as an environmental steward.

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY
Delaware No. 1 Water Pollution Control Facility - Camden, New Jersey

The Camden County Municipal Utilities Authority (CCMUA) Delaware No. 1 Water Pollution Control Facility implemented their EMS beginning in February 2000. EMS implementation was an internal decision that the Authority should utilize a systematic approach to managing their environmental, business, and community responsibilities efficiently and effectively. Technical assistance was provided by the consulting firm of Camp Dresser & McKee Inc.

EMS Fenceline
- Delaware No. 1 Water Pollution Control Facility in Camden, New Jersey.
- New Jersey's 4th largest wastewater treatment plant with a design capacity of 80 MGD and a hydraulic Capacity of 160 MGD.
- 145 employees operate and maintain the treatment plant, sewer collection system, and administration.

Key Reasons for Implementing an EMS
- Optimize performance of the treatment plant through systematic, ongoing identification of improvement opportunities.
- Better equip CCMUA staff to perform their jobs with defined roles, responsibilities, training, and procedures.
- Effectively respond to privatization pressures through internal efficiencies.
- Enhance public image, especially with regards to odor complaints.
- EMS provided a systematic, proven approach – stamp of authenticity.

Current Environmental Targets
Camden County established the following environmental targets to measure progress in meeting EMS objectives for 2005:
- Maintain suspended solids and Biological Oxygen Demand (BOD) below 20 ppm, with a target of below 15 ppm.
- Complete elimination (100%) of offsite odors.
- Maximal capture of wet weather flow, without adversely impacting water quality.

Top 3 Keys to Success	1. Must have defined plans with accountability (i.e., who, what, by when).
	2. Routine follow-up to make sure plans are being implemented.
	3. Demonstrate a continued commitment to positive progress and ensure that all team members understand expectations.
Top 3 Barriers	1. EMS was a relatively new and innovative approach, thus had to be sold throughout the organization.
	2. Feeling that public sector organizations are limited and that there are no "carrots" for employee motivation and buy-in.
	3. Achieving a comfort level with the program whereby employees would feel their ideas are listened to.

	1. Stay persistent and hold teams and/or team members accountable for defined responsibilities and action plans.
	2. Not the same drivers as in the private sector, thus need to adapt business case and consider rate payers.
Top 3 Lessons Learned	3. Don't overlook the wealth of knowledge and experience internally within your organization.

Resource Commitment

- 70% of time dedicated by single Environmental Management Representative.
- 7 members on the EMS Steering Committee.
- EMS Steering Committee, made up of select managers and employees, met weekly during initial stages and transitioned into a quarterly or as needed meeting schedule.
- CCMUA has institutionalized their EMS to the point that EMS goals are the same as overall organizational goals. Therefore, direct labor costs spent on EMS are the same as daily direct operational costs and can no longer be differentiated.

Return on Investment – EMS Benefits

CCMUA achieved the following "low hanging" fruit by 2000, shortly after implementing their EMS:

- Regularly discharging effluent that ranged from 12-18ppm, having struggled in the late 1990's to meet 30 ppm limits on a consistent basis.
- 25% reduction in operations and maintenance costs from $21.2 million in 1996 to $16 million in 2000, resulting in a 6% lower rate than in 1996.
- 20% increase in tonnage of sludge removed from the plant from 46,000 tons in 1999 to 55,000 tons in 2000.
- 90% reduction in verified odor complaints from 16 in 1997-1998 to 2 in last 6 years.
- Implementation of New Jersey Department of Environmental Protection (NJDEP) approved community notification system that provides the neighboring community with 24-hour telephone access for reporting odor concerns. The hotline provides real time community input to CCMUA's EMS.
- Provided a vehicle for communication with Board, whereby monthly reports and updates became expected and valued.

Since 2000, CCMUA has continued to experience EMS benefits, including:

- Reduction of wet weather bypasses from 24 in 1999 to 2 over the last 6 years.
- Optimization of water quality through improvement to sludge thickening and dewatering, to primary and final sedimentation tanks, and operational accountabilities and goal setting.
- CCMUA now removes 60,000 tons of sludge per year, an increase of 25% since 1999.
- Reduced offsite odors by initiating a zero tolerance program.
- Cost savings by identifying inefficiencies, water reuse, and energy efficiencies. CCMUA has held its rate for 10 straight years, with three rate cuts during this period.

EXECUTIVE SUMMARY #4

OAKLAND COUNTY DRAIN COMMISSIONER'S OFFICE
Wastewater Treatment Complex – Waterford, Michigan

The Oakland County Drain Commissioner's Office (OCDC) in Waterford, Michigan implemented its EMS, beginning in January 2003, through participation in the U.S. EPA supported Third EMS Initiative for Government Entities (www.peercenter.net). The Drain Commissioner's Office previously developed an ISO 9001 registered Quality Management System and in April 2005 received ISO 14001 registration. The adoption of complementary ISO principles allowed the OCDC further measurement tools to ensure the high quality standards that county residents have come to expect.

EMS Fenceline

- Two Divisions: Engineering & Construction and Operation & Maintenance.
- Approximately 260 staff members.
- Twenty units, including Project Management, Regulatory Review, Environmental Stewardship, Operations and Maintenance service for Storm Drains, Sewers, Water Supply, Wastewater Treatment, and Administration.
- Commerce Wastewater Treatment Plan, George W. Kuhn Retention Treatment Basin, Pump Maintenance Facility, Walled Lake/Novi Wastewater Treatment Plant and Water Maintenance Facility.

Key Reasons for Implementing an EMS

- Improve employee awareness of environmental issues.
- Develop a working relationship with federal and state agencies.
- Positive impact on helping customers.
- Commitment to developing a positive environmental image for the county.

Current EMS Objectives and Targets

Oakland County has established Environmental Management Programs to achieve its robust quantitative EMS Objectives and Targets, which currently include:

- Reduce high dosage chlorine flushed into waters from OCDC operation and maintenance activities by developing new standards by June 2005 and by revising OCDC chlorination procedures for disinfection.
- Reduce the amount of paper used and increase the percentage of cardboard and batteries recycled by 50% within two years.
- Reduce potential for unnecessary inflow and infiltration in the Clinton/Oakland interceptor system by repairing all sub-standard manholes by December 2005.
- Reduce potential for sewer system overflows and unnecessary inflow and infiltration in the Evergreen-Farmington Sewage Disposal System by rehabilitating all sub-standard floodprone manholes by December 2005.

Top 3 Keys to Success	1. Taking the time to visit each of the facilities, meet with management and employees, and discuss the initial goals and objectives. This was effective in showing support and keeping everyone updated.
	2. Effective communication. It is worth the time and effort to keep everyone on the same page with consistent understanding and involvement from all levels of employees.
	3. Top management involvement in setting goals and defining environmental management programs.
Top 3 Barriers	1. Selling the benefits of environmental responsibility to municipal customers.
	2. Initial confusion associated with integrating management systems and initiatives. Many employees viewed early efforts as three separate initiatives (ISO 9001, ISO 14001, and EMS).
	3. Managing resources was difficult as many employees face "competing" responsibilities on top of ISO implementation.
Top 3 Lessons Learned	1. Communicate early and often across all lines of the organization. Avoid early confusion.
	2. Translate EMS terms into organization terms as much as possible, especially in the beginning.
	3. Keep all players involved from goal setting to ensure uniformity.

Resource Commitment

- Five members on the EMS Core Team.
- 477 hours dedicated by a single Environmental Management Representative ("EMR"), over a two-year period, to serve as overall program manager or team leader for the EMS implementation.
- Semi-monthly Steering Committee meetings (top management and EMS Core Team) were held during implementation, and monthly meetings continue.
- One complete EMS cycle (24 months) required 2,646 total person hours at a total cost of approximately $130,559 in direct labor resources.

Return on Investment – EMS Benefits

- Retention of "institutional experience" which previously left with the retirement or transfer of key veteran employees.
- Employee ownership of managing environmental impacts, resulting in ideas and suggestions for improvement.
- ISO 14001 Third-party Registration.
- Benefit of having an integrated Quality and Environmental system
  - Cost savings
  - Utilize and build on existing systems
  - Avoids confusion

CITY OF LOWELL, MASSACHUSETTS
Regional Wastewater Utility

The Lowell, MA Regional Wastewater Utility implemented their EMS beginning in August 1997 through participation in the U.S. EPA supported First EMS Initiative for Local Governments (www.peercenter.net). The Utility proceeded to achieve ISO 14001 certification for all divisions in August 2000 becoming the first wastewater utility in the nation to achieve this distinction.

EMS Fenceline

- Lowell Wastewater Utility – an activated sludge facility with a design flow of 32 million gallons a day (MGD).
- Provides primary and secondary treatment to more than 180,000 users in five communities.
- The system includes 230 miles of sewer lines, 5,000 catch basins, 5,000 manholes, and 46 employees.

Key Reasons for Implementing an EMS

- Enhance the City's overall image;
- Improve environmental performance;
- Help lead the region's public sector toward compliance with the ISO standards through education, training, and awareness;
- Maximize efficiency, reduce costs, and avoid costly environmental emergencies thereby saving taxpayers money; and
- Compete with, and be better than, the private sector.

Current EMS Objectives and Targets
Lowell has established Environmental Management Programs to achieve their robust quantitative EMS Objectives and Targets, which currently include:

- Reduce impact on wastestream
    - Increase waste recycled by 5% by 12/31/05
    - Maintain program aimed at increasing public awareness in 2005
    - Eliminate sludge disposal to landfill
- Energy Conservation
    - Continue to reduce Kw usage by 12/31/05
- Improve chemical management
    - Achieve zero spills in 2005
    - Continue to quantify state regulated waste disposed by end of 2005
- Odor reduction
- Not to exceed previous year's odor complaints
- Improve industrial effluent
- Establish inter-departmental new business awareness program

Top 3 Keys to Success	1. Hard working and dedicated staff.
	2. Supportive upper management, including City Manager, City Council, and other elected officials.
	3. Hiring an external consultant to assist with document control and the development of the EMS manual.
Top 3 Barriers	1. Time and resource allocation – educating employees about the ISO concept and conducting implementation activities can be time consuming.
	2. Lack of active support and buy-in from the community.
	3. Staff turnover, including the loss of key Core Team members.
Top 3 Lessons Learned	1. Hire an external consultant to support early implementation and training efforts.
	2. Add an additional facility within the original EMS fenceline to eliminate duplicating efforts down the line.
	3. Development of metrics proved to be one of the most difficult EMS elements, as this practice was still relatively new in the municipal sector.

Resource Commitment

- 14 members on the original EMS Implementation Core Team, including the Executive Director, with 7 members currently on the EMS Team.
- 10% of time dedicated by a single Environmental Management Representative ("EMR") to serve as overall program manager or team leader for the EMS implementation.
- Bi-weekly Core Team meetings (14 team members) during the EMS development phase and less frequent, focused meetings during the ongoing maintenance phase of the EMS.
- One complete EMS cycle (24 months) required 1,424 total person hours at a total cost of approximately $27,100 in direct labor resources, $10,500 in consultant costs, and about $4,800 in other travel and material costs.

Return on Investment – EMS Benefits

- Lowell became the first municipal facility in the U.S. to certify all of its divisions to the ISO 14001 Standard.
- In the first three years, Lowell realized several direct cost savings of over $180,000 (some annual savings) through recycling and energy reductions.
- In 2004, Lowell accomplished the following results:
  - 46,893 total lbs of materials recycled
  - 110 total gallons utility used oil recycled
  - 140 total gallons citizen oil recycled
  - 1,520 total linear feet of fluorescent bulbs recycled
  - No reportable chemical spills
  - Odor complaints reduced by 50% from 2003 levels

EMS CASE STUDY #1

KENT COUNTY DEPARTMENT OF PUBLIC WORKS
Wastewater Treatment Facility

Organizational Profile/Background
Kent County is in the middle of Delaware's three counties. It is the smallest of the three having a population of approximately 134,000. The major city in the county, Dover (which is the second largest city in Delaware), also serves as the state capital. Kent County is bounded to the north by New Castle County, to the south by Sussex County, to the west by Maryland, and to the east by the Delaware River and Delaware Bay. The county is a mix of industry, regional commercial banking and retail, farming, and numerous bedroom communities for nearby Wilmington, DE and Philadelphia, PA. Major activity areas within the county include a state park, Dover Air Force Base, Dover Downs, the Delaware State Fairgrounds complex, and several significant industries who discharge into the county wastewater system.

Kent County is a commissioner-based, county manager operated government. It consists of three major departments and several smaller departments. The major departments are Public Safety, Planning, Parks and Recreation and Public Works. The County has over 250 employees within these three and several smaller departments. Included within the Public Works Department is a 16 MGD wastewater treatment plant that treats most of the wastewater in the county, over fifty pump stations and nearly 50 miles of gravity sewer and force main, and management of County owned buildings. The wastewater that enters the Kent County regional system comes from five municipal contract users and ten significant industrial users. The City of Harrington operates a separate advanced wastewater treatment facility.

An on-site private contractor, K-F Environmental Technologies, Inc., treats and facilitates land application of a Class A biosolids. Kent County and K-F currently treat the biosolids from the Harrington facility and will shortly be contracted to land apply the biosolids on County-owned property.

NATIONAL PILOT PROJECT PARTICIPATION
The Kent County Department of Public Works decided to implement their EMS through the *3rd EMS Initiative for Public Entities*, a U.S. EPA supported national pilot project facilitated by the Global Environment & Technology Foundation (www.getf.org). During the initial stages of participation and EMS implementation, Kent County also decided to join the National Biosolids Partnership program which allowed the organization to follow the implementation plan of the EMS Initiative and include their biosolids partner operations.

Since August 1997, 32 public entities have benefited from environmental management system (EMS) implementation thanks to their participation in three "EMS Initiatives for Local Government Entities" initiatives. The initiatives were made possible through a cooperative agreement between the U.S. Environmental Protection Agency (EPA) and

the Global Environment & Technology Foundation (GETF). The initiatives tested the applicability and benefit of an EMS on environmental performance, pollution prevention, and stakeholder involvement in government operations. Participant organization's have included ports, universities, utilities, wastewater treatment, and others further promoting EPA's overall policy to actively promote adoption of EMSs in key sectors. For more information on these initiatives please visit www.getf.org/projects/muni.cfm.

The goal of the National Biosolids Partnership (NBP) EMS Demonstration Program, a not-for-profit alliance formed in 1997 between the Association of Metropolitan Sewerage Agencies (AMSA) and Water Environment Federation (WEF), with advisory from the U.S. Environmental Protection Agency (EPA), is to advance environmentally sound and accepted biosolids management practices. A central component of this effort is a national EMS pilot program involving over 100 participants throughout the nation. For more information see www.biosolids.org.

EMS FENCELINE SELECTED   Kent County selected the wastewater treatment facility and collection system as their initial EMS fenceline. The Department of Public Works maintains and operates the regional wastewater collection and treatment system, building maintenance and engineering functions to support both. The regional system serves 70% of the Kent County population through a 16 MGD wastewater treatment plant, collection system consisting of fifty-nine pump and lift stations, and over forty-five miles of force main and main sewer lines.

This select area of operations currently employs thirty-nine staff with an additional fourteen engineering staff that have some responsibilities related to wastewater operations. This selection offers a unique opportunity to promote a public/private partnership, since the biosolids portion of the wastewater facility is owned and operated by K-F Environmental Technologies, Inc. After biosolids treatment, the material referred to as Kentorganite is turned back to the County for application on local farmland as a fertilizer and soil amendment.

KEY REASONS FOR IMPLEMENTING AN EMS

Kent County sought to implement an EMS because the county not only wanted to be a better environmental steward, but also wanted to reduce its emissions, improve operational safety, and optimize both its resources and the quality of the system's byproducts. The following were initial goals defined by the organization:

KENT COUNTY EMS ORGANIZATIONAL GOALS

1. Maintain compliance with all permits (NPDES, CAA, Biosolids, etc.).
2. Reduce emissions into air, water, etc.
3. Optimize nutrient loading from Kentorganite on local farms.
4. Improve plant safety.
5. Optimize the use of operational resources (funds, personnel, etc.).
6. Be in a better fiscal shape to lower bond and insurance costs.
7. Build a better working relationship with K-F Environmental Technologies (biosolids contractor).
8. Be an EMS leader within the State of Delaware and Kent County, particularly with respect to other governmental agencies and local industries.
9. Be a better environmental steward.
10. Improve relationships with general community and other interested stakeholders.
11. Be better able to handle job succession issues such as the transfer of "Tribal" Knowledge".
12. Receive third party certification under ISO 14001 and 18001, and the NBP program.

EMS CORE TEAM STRUCTURE

Kent County initially recruited personnel for their EMS Core Team by placing "teaser" posters about EMS in order to promote curiosity and interest. This also served as a valuable awareness building tool within the organization. Based upon responses, management gauged the level of interest and defined the initial Core Team. The EMS core team is made up of eight members, including area managers from each distinct operational area, with the Environmental Program Manager designated as the EMS Project Manager or "Environmental Management Representative (EMR)". Top management is actively involved in all core team activities, including regular participation by the Public Works Director and Assistant Public Works Director.

Kent County selected Jim Newton, Environmental Program Manager, to lead the EMS implementation. Mr. Newton holds a bachelor's degree in engineering science and master's degrees in both engineering science and civil engineering. Mr. Newton joined Kent County in 2002 and became the internal champion for EMS implementation from past experience within a chemical engineering company. Prior to EMS implementation, Mr. Newton's responsibilities included tracking new and revised regulations, revising the County Standards and Code, pretreatment coordination, and managing the County's Fats, Oils, and Grease (FOG) Program. Mr. Newton has over 27 years of professional experience and is a licensed environmental engineer in 14 states.

The following EMS chart details the basic team structure:
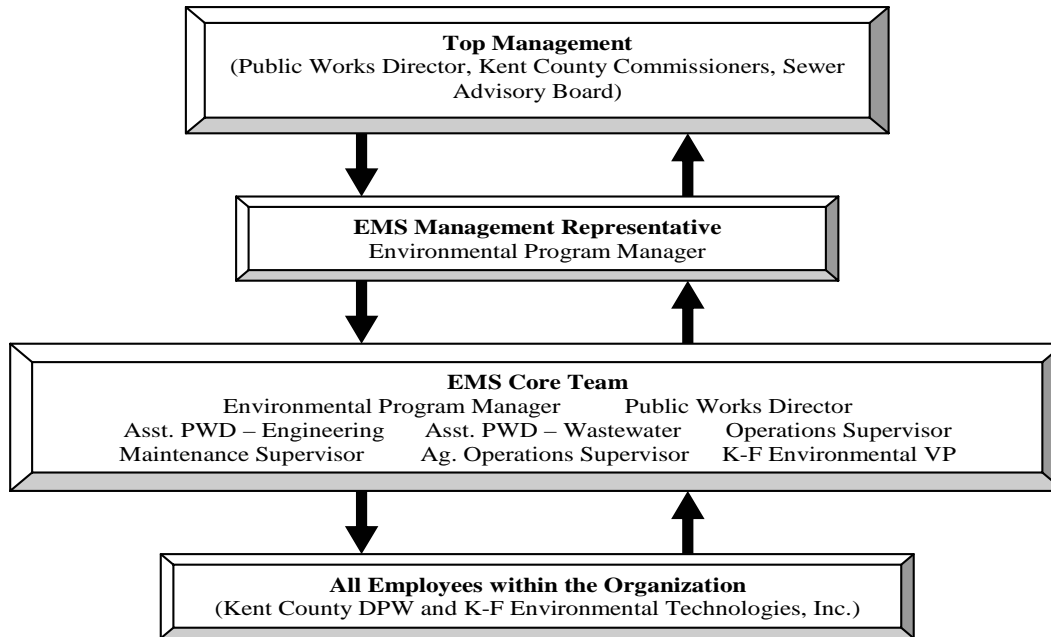
ENVIRONMENTAL POLICY   Kent County developed their initial Environmental Policy after a year of EMS implementation, opting to defer until after the environmental aspects and impacts were identified. This is an approach that many organizations have selected, which allows an organization to develop a more specific Environmental Policy, one that truly captures the mission and unique characteristics of a particular organization.

In this case, Kent County developed a combined policy that included a clear commitment to include their biosolids operations and comply with the NBP Code of Good Practice. As part of the first round EMS Management Review, the County decided to expand their EMS to include Safety and Health as well. When this decision was confirmed, they rightly decided to review their policy and add in the expanded commitment to safety and health and ensure that the new policy was officially signed by the Levy Court (see p. 28 for a copy of the Policy).

Environmental/Biosolids Policy

- **C**omply with regulations and NBP Code of Good Practice
- **H**ave an environmental/biosolids vision
- **I**mprove continuously
- **R**eadily share information
- **P**ractice pollution prevention

Adopted by Levy Court on December 9, 2003

SIGNIFICANT ASPECTS & IMPACTS   The Environmental Aspect and Impact element of EMS implementation is the step where organization's asses the operations, services, and activities within their EMS fenceline and identify how each positively and negatively affects the environment. The

result is most commonly a list of environmental aspects (how you interact with the environment) and impacts (actual impact on the environment) that helps an organization visualize their "environmental footprint" and focus in on the most significant impacts. Kent County utilized a systematic approach to identifying their significant aspects and impacts, which included shared responsibility among each member of the Core Team. The County took the following steps in the aspect identification process:

Operation Activities

1. Each area manager was tasked to identify all activities that occurred under his/her direction. In doing so, each manager was asked to fill out an Input/Output diagram for each central activity. This approach allows for easy identification of impacts, waste, and byproducts. Area managers used operations personnel to assist in preparation of the I/O charts as they are the people that conduct activities and know them "in and out".
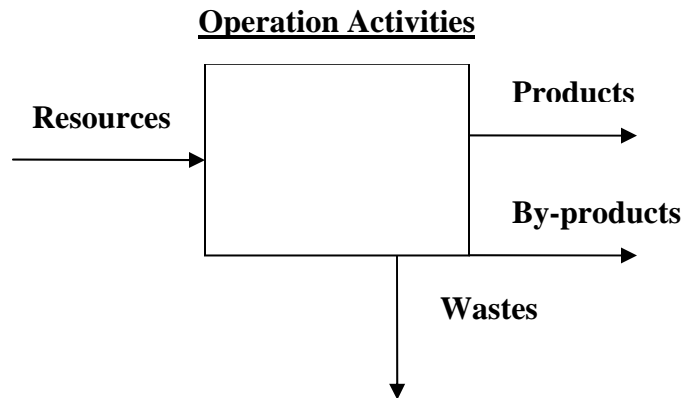
2. The EMS Core Team, as a group, conducted a review of submitted I/O diagrams and developed a list of aspects relevant to each activity. The lists of activities and associated aspects were put together into a single table, which resulted in a list of 95 total environmental aspects.

3. Environmental impacts were identified and ranked for each individual aspect based upon the following list:
   - Changes in air quality
   - Changes in water quality
   - Direct exposure to agent
   - Changes in habitat
   - Nuisance (including odor)
   - Conserves/depletes resources
   - Frequency/probability
   - Regulated
   - Critical control point (NBP designation)
   - Recently added Energy, and Health and Safety as additional factors to be included in rankings.

4. The Core Team determined the significance of each environmental aspect by using the best professional judgment with respect to the impacts associated with each aspect, assigning a value from 0-5 for each aspect (with 0 being no impact and 5 being major impact). Where there was disagreement between the Core Team, they used an average score. A regulated activity received a ranking of 5 within that impact area and an unregulated received a 0. Because of Kent County's simultaneous involvement in the National Biosolids Program, Critical

Control Points (CCP), as defined by the program guidelines, received an additional rating of 3 and non-CCP received a rating of 0.

The initial ranking of aspects was conducted by the Environmental Management Representative for efficient use of the Core Team member's time. The Core Team then met to evaluate and "truth test" the rankings of all environmental aspects and determine which should be designated "significant".

Based upon the Core Team discussions, Kent County designated the following as their initial significant aspects:

Environmental Aspects
Spreading of Kentorganite
Running dryer scrubber
Running dryer boiler
Kentorganite spills
Sanitary sewer overflows – force mains
Running the dryer
Sanitary sewer overflows – pump stations
Changing chlorine cylinders

EMS OBJECTIVES, TARGETS, AND PROGRAMS Based upon the identification of significant environmental aspects, Kent County developed the following Objectives, Targets, and Programs to promote and measure environmental performance.

Objective: Reduce air pollution

Target	Program(s)
Reduce sulfur, particulate and CO emissions by 50% from CY 2002 levels	▪ Develop Operational Controls for Biosolids Operations focused upon consistency in process among all shifts. ▪ Replace 75% of Diesel Usage with Biodiesel in Operating Equipment. ▪ Replace Emergency Generator Diesel Fuel with Biodiesel. ▪ Obtain approval from state regulatory agency (DNREC) to allow generator load sharing. ▪ Replace Dryer Diesel Fuel with Bio-Fuel Made from Grease

Target	Program(s)
	Trap Waste or Biodiesel.

Objective: Reduce energy consumption

Target	Program
Reduce electricity usage by 20% from CY 2002 levels	▪ Enroll in EPA Green Lights Program. ▪ Obtain approval from state regulatory agency (DNREC) to allow generator load sharing. ▪ Upgrade to more Energy Efficient Pumps, Lights, etc. ▪ Seek Renewable Energy Alternatives such as Wind.

Objective: Reduce or eliminate effects of chlorine and sulfur dioxide

Target	Program
Improve safety of existing processes or switch to an alternative disinfection method	▪ Develop Operational Controls for Current System. ▪ Evaluate Chlorine Hazard Potential ▪ Hire Consultant to look at Cost Effective Alternatives ▪ Develop Plans for Alternatives or Ways to Improve Safety of Current Systems ▪ Budget Finances ▪ Secure Financing ▪ Operate

Objective: Reducing sanitary sewer overflows

Target	Program
Reduce SSOs by 40% from CY 2002 levels	▪ Develop System to Document Sources of SSOs. ▪ Implement Fats, Oils, Grease (FOG) Program. ▪ Develop Action Plans to Reduce or Eliminates SSOs. ▪ Develop CMOM Program.

BENEFITS OF ADOPTING AN EMS

Energy Savings

Kent County's annual electric bill exceeds $600,000 and they want the EMS to reduce their electric load. Under serious consideration is installing a renewable energy system using wind to replace electricity generated by local power plants. The County is currently in the process of collecting a year's worth of wind data to fully assess the project's potential. The County is also pursuing the construction of an on-site bio-gas facility with a local cooperative partner and generator load sharing.

> **Expected Benefits:**
> - Reduce the plant's electric costs by $200,000 - $300,000 per year.
> - Reduce air pollution by 5 million pounds of CO_2 per year, the equivalent of taking 500 cars off the road, as measured at the power plants generating the electricity that has been deferred.

Employee Succession

Like many wastewater agencies throughout the U.S., Kent County has several operators that have been on staff for over 30 years. The County estimates that one-third of the workforce, with decades of practical experience, will retire in the next five years. The EMS ensures regular training, transfer of "tribal" knowledge from long time staff to new employees, and consistency in best management practices among all shifts. Kent County has successfully recorded critical processes or activities via flow charts, work instructions, diagrams, and even photographs! In addition, this presented a great learning opportunity for the EMR and Core Team members to learn the in's and out's of the organization's activities. A part-time EMS intern shadowed employees conducting covered activities, asked questions about procedures, drafted operational controls and standard operating procedures, and truth tested them with employees.

Reduction in Air Pollution

Kent County has switched from Fuel Oil No. 2 to B20 biodiesel as a fuel source for its emergency generators and is considering a switch to B20 for all of its diesel fleet and potentially as the primary fuel for its biosolids heating system. Collectively, the County uses approximately 300,000 gallons of fuel per year.

> **Expected Benefits:**
> - 20% reduction in hydrocarbon emissions.
> - 12% reduction in carbon monoxide emissions.
> - 12% reduction in particulate emissions.

Improvements in the Chlorine Delivery System and Management

The EMS has established controls for the operation of the chlorination/dechlorination system operating at the plant, ensuring that chlorine and sulfur dioxide cylinders are changed out using the same process for all three shifts providing the most employee and public health protection possible. The EMS has begun to evaluate alternatives to the current system as a part of its continuous improvement program. The controls utilize "Tribal" knowledge gained by operators who currently have 25-30 years experience to ensure that the operation meets all standards.

Sanitary Sewer Overflow Reductions

Sanitary sewer overflows (SSOs) are a serious problem operating any sewage collection system. The EMS has helped to emphasize the importance of reducing these events. A fats, oils and grease (FOG) reduction program has been established within County Sanitary Code requiring food service providers to acquire a permit for grease traps and interceptors. For 2004, an 85% reduction in SSOs from 2002 levels has occurred.

Improved Public Image

Another benefit of the EMS program has been improved public visibility of the treatment plant. The plant was awarded a National Association of Counties (NACo) 2004 Achievement Award, placed second in the 2004 Clean Water Act Recognition Awards for its Pretreatment Program, and was named one of five Facilities of the Year by Environmental Protection magazine for its FOG program. A website that provides information on the EMS has had approximately 1,000 visitors. Representatives of the department have given numerous presentations at regional and national conferences about the EMS. A local citizens committee has been established to oversee the EMS and provide input into the EMS targets and objectives.

Be an EMS leader within Delaware and Region

As a result of participation in the EMS, the County has made numerous presentations on the program. The presentations have included several Water Environment Federation (WEF) conferences including the Biosolids Specialty Conference and WEFTEC. Representatives of the County serve on the WEF EMS Committee, have served on the Steering Committee for a major EPA publication regarding EMS development and implementation at wastewater facilities, and assisted with an EMS training session sponsored by the Delaware Dept. of Natural Resources and Control (DNREC) promoting EMSs at other public agencies. The County has established a web page devoted to the EMS that includes Adobe Acrobat versions of the major EMS procedures.

IMPLEMENTATION STRATEGY AND TIME FRAME

PHASE 1

January 2003 – May 2003
- EMS Awareness/Training
- Data Collection - Baselines
- EMS Fenceline definition
- Core Team formation
- Gap Analysis
- Document Management

PHASE 2

June 2003 – September 2003
- Environmental Policy
- Legal and Regulatory Requirements
- Significant Environmental Aspect Identification

October 2003 – March 2004
- Establishing Objectives & Targets
- Environmental Management Programs (top management to attend)

PHASE 3

April 2004 – December 2004
- Monitoring
- Measuring
- Internal EMS Audit
- Management Review

PHASE 4

As a participant in two national pilot projects, the 3rd EMS Initiative for Public Entities and the National Biosolids Partnership, Kent County followed a structured approach to EMS implementation. The basic approach was broken down into 4 distinct faces, with each phase requiring completion of detailed tasks and documentation, over a 24 month period. The County started implementation in January 2003 and complete their initial internal audit and management review in late December 2004.

OUTREACH   Kent County has made external communication a central component of their EMS implementation, utilizing the following main strategies:

1) ***EMS Graphic Identity***: To promote consistent recognition and give the EMS efforts an identity, the County developed a cartoon figure called CHIRP. The word is an acronym that forms the basis of their Environmental Policy. This mascot has since been used on all EMS related internal and external outreach, including on coffee mugs, mouse pads, magnets, brochures, the website, etc…

2) ***Sewer Advisory Board***: The Board is made up of citizen representatives with the responsibility of advising the Commissioner on sewer-related issues. Kent County leveraged the existence of this group and designated them as the County's Public Awareness Committee for their EMS under the National Biosolids Program. The county provides monthly updates to the Board during scheduled meetings and has conducted EMS awareness training to promote thorough understanding and communication.

3) ***EMS Website***: The County developed, during the relatively early stages of EMS implementation, a website devoted to their EMS related efforts. On this website, the interested parties can find updated information including the Environmental Policy, EMS procedures, presentations, lists of significant aspects, objectives and targets, and benefits. The site provides a central clearinghouse of information for both internal and external purposes, http://www.kentcountydpw.com/kent_county_environmental_manage.htm.
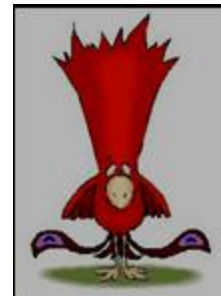
RESOURCES REQUIRED TO IMPLEMENT/MAINTAIN THE EMS

Internal Labor -- One complete cycle of EMS implementation, over a 24-month period, required Kent County to commit 2,985 total direct labor hours at a cost of approximately $101,681.   This number represents the direct labor hours employees performed in addition to their regular duties

ISO Registrations and Audits -- Kent County plans to pursue ISO 14001 (Environmental Management System) and 18001 (Occupational Safety and Health) Registration by Fall 2005, as well as certification to the National Biosolids Program Guidelines. Based on the costs incurred by other local governments and initial estimates from the selected auditor, Kent County estimates the registration process will

cost approximately $30,000 for a 3-year combined (ISO 14001, 18001, and NBP) audit cycle ($15,000 for the ISO 14001/18001 and $15,000 for the NBP).

Other Material Costs -- Kent County spent approximately $3,237 on other materials during implementation including EMS software, promotional materials (i.e., magnets and mugs), and graphics.   Participation in the national EMS pilot project also required travel and related costs for workshop participation.

3RD PARTY VERIFICATION

The County will seek third party certification for its EMS not only through ISO 14001 registration, but as a member of the National Biosolids Partnership in November 2005. The county is also working to integrate occupational safety and health measures to meet the ISO 18001 Standard, which would offer an additional registration and recognition opportunity. This decision was reflective of a direct recommendation from Levy County Court to expand the original scope of the EMS to include health and safety. The County is currently setting their sites on a combined, single external audit that will cover all three elements of their management system. Kent County has selected a firm with the unique capability of providing auditing services that meet the ISO 14001, ISO 18001, and National Biosolids Program guidelines.

> *"The benefit of having third party certification for our EHS-MS program is to add legitimacy to it in the eyes of our employees, constituents and the general public. It makes no sense to expend the resources to develop and implement the EHS-MS program and not add a way to show it is more than just a program of the month. The cost of the audits are outweighed by the goodwill and credibility gained though them."*
>
> Jim Newton
> Environmental Program Manager

KEYS TO SUCCESS/BARRIERS/LESSONS LEARNED

Kent County's EMS implementation was characterized by a high level of commitment up, down, and throughout the organization, which was maintained from beginning to end. Like many organizations, Kent County found that achieving and maintaining momentum behind the EMS was the key to success.   During the interview for this case study, Jim Newton, Environmental Management Representative, commented that "establishing momentum towards accomplishing the tasks was critical. It's like rolling a boulder down the hill. It takes quite a bit of effort to begin to make it roll, but it quickly gathers momentum as it rolls." Kent County also found that communication is essential to all involved in EMS implementation, including outside contractors. Realizing this early on and because their unique approach to EMS included a private, on-site partner, Kent County included outside contractors on their Core Team.

> *"The EMS has helped us improve internal communication, problem detection and solution, teamwork, expedited decision making and job/task completion. It is time consuming, but also has its numerous rewards."*
>
> Reinhold Betschel
> Assistant Public Works Director –
> Wastewater Facilities

Top 3 Keys to Success

1. Active senior management support. Kent County's Assistant Public Works Director participated in nearly every Core Team meeting and was instrumental in decision-making. In addition, the Public Works Director was also actively involved attending several Core Team meetings, training sessions, and conducting community outreach. Whenever the EMR called on them their support was there.

2. Committed Core Team that understood the program and desired to see it completed.

3. Participating in the U.S. EPA supported national initiative and NBP Program allowing Kent County to learn from prior participants and utilize the knowledge and guidance provided by GETF technical assistants.

Top 3 Barriers

1. It is important not to take too long to "roll out" the program and implement the EMS. The first cycle should take 1.5-2 years. Early momentum is key. Kent County utilized an early poster campaign to spark interest among staff and followed this up with active engagement of the Core Team. The EMRs enthusiasm for the program also resonated throughout the organization.

2. It proved more difficult than originally expected to facilitate the private-public partnership and to keep all team members on the same page and committed. Kent County's private partner, K-F Environmental, Inc., remained supportive throughout the implementation, attending workshops and meetings, but faced difficulty due to high intensity, limited staff required operations.

3. Many organizational layers have to agree to participate in the program, internal and external. The Directors awareness and active involvement were important, especially in promoting the program to the County Board and advisory committee. Additionally, the organization made a good decision to include area manager's on the Core Team which created direct communication links throughout the organization.

Top 3 Lessons Learned

1. It's important to undertake the project using the assistance of practitioners and experienced technical assistance providers and take advantage of Federal and/or state supported programs. Kent County participated in the 3rd EMS Initiative for Public Entities and the National Biosolids Partnership program, both

national EMS pilot projects supported by the U.S. Environmental Protection Agency.

2. Active senior management involvement throughout the project, even before implementation actually begins, such as participation on the Core Team.

3. The EMR or a representative (such as our EMS Intern) must interact with team members on an almost daily basis, especially during the first stages of EMS implementation. Kent County relied heavily, especially during the second year of implementation, on the assistance of an intern that happened to be studying towards her masters in the use of EMS as a management tool. With a flexible schedule, the intern was able to spend quality time with individual team members, identifying and detailing critical steps in controlling environmental impacts. In addition, the close working relationships resulted in EMS dialogue and awareness building throughout the staff.

NEXT STEPS Kent County will continue developing its EMS and advance its environmental targets. The County will seek third party certification for its EMS not only through ISO 14001 registration, but as a member of the National Biosolids Partnership in November 2005. The county is also working to integrate safety and health measures to meet the ISO 18000 standards, which would offer an additional registration and recognition opportunity. In addition, the County continues to look for opportunities to promote EMS and showcase their achievements throughout the region.

Kent County is also in the development stage of a program referred to as the Pretreatment Environmental Excellence Program (PEEP), which will potentially offer regulated industries an opportunity for reduced sampling, fines, and application fees, as well as recognition awards for installing an EMS to cover pretreatment operations.

In addition, Kent County has formed a Pretreatment Advisory Workgroup (PAW) in order to continue outreach for the EMS to interested stakeholders.

ADDITIONAL INFORMATION For additional information on Kent County's EMS experience and progress, please contact:

Jim Newton
139 Milford Neck Road
Milford, Delaware 19963
302-335-6000
james.newton@co.kent.de.us

In addition, Kent County maintains an up-to-date website devoted solely to their EMS implementation:
http://www.kentcountydpw.com/kent_county_environmental_manage.htm.

Kent 🛡️ **County**

Levy Court

Commission Members
David R. Burris, President
Ronald D. Smith, Vice-President
Allan F. Angel
P. Brooks Banta
Donald A. Blakey, Ph.D.
Richard E. Ennis
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414 Federal Street
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(302) 744-2305
FAX (302) 736-2279

Environmental/Health and Safety/Biosolids Policy.

A. The Kent County Levy Court commits to reduce the impact of its operations on the environment, by adopting the International Organization for Standardizations (ISO) 14001 Environmental Management Systems standards, the International Organization for Standardizations (ISO) OSHAS 18001 Occupational Health and Safety Management Systems standards, and the National Biosolids Partnership (NBP) Code of Good Practice for the wastewater collection and treatment facility operations directed by the Department of Public Works. In addition, the Levy Court requires all public works contractors employed at the covered facilities to abide by this Policy to the maximum extent practicable.

B. The Levy Court commits to:

   (1) Comply with all applicable environmental laws and regulatory requirements, to the NBP Code of Good Practice, appropriate occupational health and safety practices, and any other requirements to which the organization subscribes;

   (2) Have an environmental, health and safety and biosolids vision and mission, then develop/achieve the objectives and targets to implement this mission;

   (3) Improve continuously, through the EHS-MS, the management of the environment, employee health and safety, wastewater effluent and biosolids product;

   (4) Readily share its wastewater operations, health and safety, and biosolids information with interested stakeholders; and

   (5) Promote pollution prevention activities, including energy conservation, and appropriate health and safety practices.

David R. Burris
David R. Burris
President, Kent County Levy Court

Mar 31, 05
Date

"Serving Kent County With Pride"

EMS CASE STUDY # 2

NATICK DEPARTMENT OF PUBLIC WORKS
Springvale Water Treatment Facilities

Organizational Profile/Background The Town of Natick Massachusetts was founded in 1651 and incorporated in 1781. The Town is located in eastern Massachusetts roughly 17 miles west of Boston along the Charles River. The Town's population is an estimated 32,000 people.

Natick is a representative town government managed by a Board of Selectmen and Town Administrator. The Board of Selectmen is composed of five members who are elected for three-year terms. As the Chief Elected and Executive Officers of the Town, the Selectmen are vested with all the municipal authority not specifically retained by the Town's legislative body. The Selectmen appoint a Town Administrator, responsible for the daily management of the Town, whose powers are specified in the Town of Natick Home Rule Charter. The Town Administrator is responsible for the management of all Town departments (excluding the School Department), all Town funds, for providing support to the volunteer committee system, working with other levels of government, and managing special projects for the Board of Selectmen.

The Department of Public Works is made up of eight operational divisions: Administration, Engineering, Building Maintenance, Equipment Maintenance, G.I.S. / Water, Highway, Water and Sewer, and Land Facilities and Natural Resources.

EMS FENCELINE SELECTED Natick selected the Springvale Water Treatment Facilities as their initial EMS fenceline. The Treatment Facilities include the following operations:
- Springvale Water Treatment Plant
- Drinking Water Pumping Facilities
- Drinking Water Production Wells
- Drinking Water Distribution System
- Sanitary Sewer Pumping Facilities

The Department of Public Works maintains and operates the Town's Water Treatment and Sewer system, building maintenance and engineering functions to support both. Although separate divisions for budgetary purposes, water and sewer personnel and equipment are considered a single division for operational purposes. The Town's system serves the population of approximately 32,000. The treatment system consists of three satellite water supply wells, two water storage tanks, 36 sewer stations, one

water booster pump station, and all mechanical parts for the water distribution system. The Sewer and Water Division currently employs 26 staff members to operate and maintain the town's water treatment plant, water wells, and sewer pump stations.

The Division is responsible for maintaining and replacing the miles of sewer and water mains as well as 1,400 fire hydrants throughout the town. Water meter calibration, supervision of water meter installations and supervision of water meter readers as well as inspection and testing of backflow prevention devices are other areas of responsibility. The water is tested on a weekly basis. Personnel from this division are on call twenty-four hours per day, seven days a week to respond to emergency calls for water line breaks and sewer backups. State and Federal regulations strictly control the operation of a public water supply system and sanitary sewer system. As a result, there is a tremendous amount of paperwork handled by this division. These regulations also require certain employees to be properly certified in the field of water supply, which requires extensive training, experience and testing.

KEY REASONS FOR IMPLEMENTING AN EMS Natick sought to implement an EMS because the Town wanted to be a leader in environmental stewardship, but also to ensure safe and effective management of chemicals and hazardous materials to safeguard the community and staff. The following were initial goals defined by the organization:

NATICK EMS ORGANIZATIONAL GOALS

➢ Comply with applicable environmental laws and regulations of the jurisdiction within which we operate;

➢ Honor the requirements of all the environmental initiatives that we enter into;

➢ Continuously seek opportunities to improve adherence to our environmental, health, and safety principles;

➢ Recognize that proper and responsible handling of our chemicals, materials and equipment, together with effective operating procedures, are imperative to reduce risks and protect the environment; and

➢ Continuously improve our environmental performance; and implement pollution prevention measures as our means of improving our environmental performance.

An additional EMS driver was compliance with an Administrative Agreement and Order issued by the U.S. EPA in November of 2001. Pursuant to this Order, the Town was given three years to complete over 24 pollution prevention projects, Town-wide. The projects are collectively called the Supplemental Environmental Project (SEP) and included a formal Pollution Prevention Plan. Under this Agreement, the Town committed to conduct its operations in a manner that does not cause significant impact to the environment, while maintaining compliance with applicable regulations. EMS implementation naturally became a central strategy to accomplish this and integrate this commitment into everyday operations to make it business as usual.

During the case study interview, Bob Bois (see EMR Profile below) defined several drivers for why he, as the Town's Compliance Officer, championed the EMS approach for Natick:

> ➤ Integration of environmental regulations into operations.
> ➤ As Compliance Officer, an EMS facilitates the tracking of relevant environmental regulations and applicable changes, especially in the heavily regulated water sector.

"Coming from a regulatory enforcement background, I experienced a real "epiphany" in realizing how effectively an EMS integrates regulations into everyday operations".

Bob Bois
Environmental Compliance Officer

> ➤ An increased sense of control over operations – everyone is trained to handle their responsibilities effectively and efficiently and the EMS process ensures that procedures are followed in every instance.
> ➤ Bottom-line savings for the Town, mostly through reduced waste and operational efficiencies.

EMS CORE TEAM STRUCTURE Natick's EMS core team is made up of nine members, with the Environmental Compliance Officer designated as the EMS Project Manager or "Environmental Management Representative" (EMR). The Town leveraged an existing team structure involving all department heads, termed the "Oversight Committee" to serve as strategic advisors to the Core Team. This approach allowed for existing team chemistry and comfort, especially with problem solving situations.

Due the continuous nature of operations and requisite staff responsibilities, the team had to be creative and strategic with meetings. During early implementation efforts, the night operator for the water plant came in an hour early one day a week to meet with the EMR and draft procedures and work plans. The operator was provided overtime and maintained this arrangement for approximately four to five months to ensure a successful beginning to implementation. This approach also provided for consistent EMS communication throughout the varying shifts.

As the EMS has matured, Natick has maintained the same basic team structure and personnel. The team meets less frequently, but focuses on core EMS components, such as reviewing the Environmental Policy, assessing environmental aspects and impacts, status of objectives and targets, and management review.

Natick selected Bob Bois, Environmental Compliance Officer, to lead the EMS implementation and serve as Environmental Management Representative (EMR). The Town hired Mr. Bois in

February of 2002 to help comply with the U.S. EPA Administrative Agreement and Order. In addition to complying with the Agreement , Mr. Bois is responsible for helping Town Departments comply with a myriad of environmental regulations like filing the appropriate air source registrations for emissions from furnace boilers or meeting mandated clean-up schedules on Town-owned contaminated property. As Environmental Compliance Officer, he is also the Town's Conservation Agent helping the Conservation Commission oversee and enforce the Town's Wetland Bylaw and Regulations.

The following chart details Natick's EMS team structure:

EMS OVERSIGHT COMMITTEE
Town Administrator
Public Works Director   Parks & Recreation Director   Police Department Chief
Fire Department Chief   Board of Health Director   Library Director
Chief Financial Officer   Community Development Director
Fiscal/Management Services of Schools Director

EMS MANAGEMENT REPRESENTATIVE
Environmental Compliance Officer

EMS CORE TEAM
Environmental Compliance Officer   Water and Sewer Division Supervisor   GIS Division Supervisor
Working Forman/Night Operator   Chief Plant Operator   Station Operator/Electrician
Station Operator/Plumber   Station Operator   Station Operator

ALL EMPLOYEES WITHIN THE ORGANIZATION

The majority of the implementation work was conducted by the EMS Core Team (or Implementation Team) and the EMR. The EMS Oversight Committee was utilized in an advisory capacity, focused upon monitoring EMS progress and allocation of resources. The Committee also served a fundamental problem solving role when the EMS encountered unexpected barriers.

ENVIRONMENTAL POLICY   The Natick Water and Sewer Division developed their initial Environmental Management Policy prior to formally starting EMS implementation. The Policy listed the EMS organizational goals (see Executive Summary) and was signed by the Town Administrator on December 19, 2002. This Policy represented a commitment to

provide safe and potable drinking water to the Town's residents while protecting the environment and maintaining a safe work situation for its employees.

In February 2003, the Town of Natick signed an Environmental Policy Statement declaring the Town's commitment to reduce environmental impacts and protect the local community. The statement is as follows:

ENVIRONMENTAL POLICY STATEMENT FOR THE TOWN OF NATICK

It is the policy of the Town of Natick, Massachusetts to consistently seek out opportunities to reduce or eliminate, to the extent possible, the use of toxic chemicals and generation of wastes.

It is our goal to safeguard the environment and provide a safe and healthful work environment for our employees while undertaking the Town's responsibility to serve the residents of our Town.

The Town's first priority is to integrate pollution prevention into all its activities, appropriate to the Town's goal of preventing pollution at the source. Where waste cannot be avoided, we will seek to use environmentally preferable purchasing, reuse, recycling, treatment and disposal in ways that minimize undesirable impacts to air, water and land.

Adopted February 24, 2003, by the Natick Board of Selectmen

To further promote the Town's related Pollution Prevention projects, the Town also developed a Recycled Product Procurement Policy (see Appendix A) signed into effect by the Board of Selectmen on February 24, 2003.   The Policy recognized the Town's commitment to make more efficient use of natural resources, create markets for the materials collected in recycling programs, reduce solid waste volume and disposal cost, and serve as a model for private and public institutions.

SIGNIFICANT ASPECTS & IMPACTS   Natick utilized a logical approach to identifying their significant aspects and impacts, which included shared responsibility among each member of the Core Team. In December 2002, the Core Team received a two-day training session on identifying, evaluating, and ranking environmental aspects based upon the following steps:

1. The Core Team identified the following list of activities involved in producing drinking water by using a flow chart approach:
   - Extracting and pumping ground water to treatment
   - Treating ground water
   - Storing and distributing ground water
   - Maintaining the storage and distribution system
   - Testing, monitoring, and recording
   - Pumping and collecting wastewater
   - Responding to emergencies
   - Receiving and transporting chemicals
   - Maintaining operation buildings

2. The Core Team then identified aspects and impacts associated with the defined activities centered upon what was utilized (i.e., electricity, chemicals, solid waste, parts, etc…). As the team went through this process they noted the reoccurrence of several aspects and impacts and realized that collectively certain aspects and impacts have large overall effects. Based upon this realization, the Team decided to combine reoccurring aspects and impacts into single categories. For instance, they realized that chemical releases came up as an aspect in a variety of activities. This step of consolidating resulted in a final list of approximately 100 aspects.

3. The list of aspects were then scored among 5 weighted severity criteria:
    ➢ Human health
    ➢ Affect on product
    ➢ Flora and fauna
    ➢ Regulatory concerns
    ➢ Public perception

    The resulting severity score was then multiplied by a likelihood factor to achieve the total significance score for each individual aspect.

4. The Core Team determined a significance cutoff score based upon the number of significant aspects able to be reasonably managed. The result was the following list of significant aspects:
    ➢ Chemical releases
    ➢ Regulatory compliance
    ➢ Worker safety
    ➢ Sustainable (protect) resources
    ➢ Sustainable (efficient) operations

EMS OBJECTIVES, TARGETS, AND PROGRAMS

The following list of Objectives and Targets were selected by the EMS team to address its significant aspects and its Legal and Other Requirements and are consistent with the commitment made by top management in the Environmental Management Policy for the Springvale Water Treatment Facilities:

Objectives	Targets
Prevent Chemical Releases	No more than five liquid/solid chemical spills or releases per year
Prevent Compliance Issues	No spills or releases of chemicals above regulatory reporting concentrations
Improve Worker Compensation Statistics	Maintain noise in the office space at the Springvale Water Treatment Plant to less than 70 db by December 2005

	Eliminate confined space in the sewer station work place by 2007
Protect the Aquifer as a Sustainable Resource	Train emergency response teams to protect storm water drainage in Zone II of town drinking water wells by Dec 2005
Maintain Sustainable Operations	Eliminate the use of chlorine gas as a treatment chemical at the treatment plant by December 2005
	Eliminate confined space in waste water pump stations by FY 2007

It is worth noting, as a key lesson learned, that the Core Team originally developed a list of 19 Targets for the above five Objectives. This list was developed through the Core Team brainstorming all of the things they could do without fully considering the workload created to properly plan, implement, and track each of the targets. Once the decision was made that they could not effectively pursue all 19 targets the team collectively narrowed the list down to the seven listed above.

For each individual Objective and Target combination identified in the above table, the Core Team created an *Environmental Management Program Planning Form* to identify a systematic approach for ensuring that the organization progresses towards the defined goals. Each form identified specific roles and responsibilities, including the "owner" or primary responsible party for specific actions, as well as due dates and milestones. In addition, each plan attempted to estimate the internal and external resources required for individual actions leading to the identified target. To ensure the desired performance, each plan also included a list and frequency of monitoring and measurement indicators (i.e., list of chemicals, training certification log) and associated action items.

BENEFITS OF ADOPTING AN EMS

Cost Savings
Approximately $40,000 in costs was avoided because an EMS standard operating procedure alleviated the need for back-up equipment (regulatory requirement). The regulatory agency determined that because Natick had a documented procedure, requisite competency training, and could show through auditing that the procedure had been implemented in practice, they fulfilled the regulatory requirements and were provided a waiver from needing to implement or install back-up equipment.

Natick has experienced a range of increased efficiencies and greater overall operational consistency. Due to the U.S. EPA Enforcement Order and required Pollution Prevention Projects, it was difficult for Natick to fully differentiate EMS specific savings from overall pollution prevention benefits.

Improved Compliance

Natick has experienced improved ability to meet compliance requirements. As a drinking water treatment plant, operations are heavily regulated by both state and federal agencies, but commonly only limited guidance is provided regarding the integration of regulations into day-to-day operations. Natick realized that an EMS accomplishes this. The legal and other requirement elements of an EMS allowed Natick to consolidate their requirements into a single list, develop a procedure for identifying and monitoring applicable requirements, delegate roles and responsibilities, and ensure that requisite personnel are provided with knowledge and training. Collectively, this has provided Natick with enhanced confidence that they are operating within statutory and regulatory requirements.

> *"As Compliance Officer, trying to fully keep track of water regulations is nearly impossible. An EMS has made control a lot easier. I now feel that if we do what we have trained to do, compliance will be met and everything will be fine".*
>
> Bob Bois
> Environmental Compliance Officer and EMR

Environmental Responsibility, Awareness, and Leadership

Due in large part to their EMS, Natick has improved environmental awareness, involvement, and competency of staff throughout the department and has positioned the Water and Sewer Division as an environmental leader and steward. This particular case study is a prime example, as Natick was selected as one of five participating organizations in the United States. Not only has Natick embraced this leadership role as one of only a handful of water sector EMS practitioners, it is also a showcase organization among the growing number of sustainability initiatives within Massachusetts. The combined results of the Springvale Water Treatment Plants EMS efforts and the 24 Pollution Prevention Projects, including schools, administrative offices, and household solid waste, has positioned Natick as a model of cross-operational sustainability.

IMPLEMENTATION STRATEGY AND TIME FRAME Natick formally began their EMS implementation in February 2002 and completed a "dress rehearsal" internal audit in December 2004. At the point of this first audit, and after approximately 22 months of actual implementation activities, the Division found that their EMS was approximately 85-90% in conformance with the ISO 14001 Standard.

During the case study interview, the EMR expressed that he thought his organization implemented the system relatively efficiently and that 18-24 months was about the correct timeframe for implementation of a viable and effective EMS. The general approach utilized by the Town was for the EMR to accept the bulk of responsibility for managing implementation activities, strategically involving and delegating the resources of team members throughout the implementation. The approach mainly resulted in the EMR working directly with the technical consultant in drafting procedures and plans, which were then presented to the full team for review, comment, and implementation.

The Oversight Committee and Core Team devoted the most significant portion of their time and efforts during key EMS implementation activities, including aspect/impact analysis, setting of objectives and targets, and the internal audit. The approach was

effective in that it relied upon the collective practical knowledge of the full EMS team at strategic times to ensure that Natick developed an EMS that was realistic, applicable, and results driven.

Natick planned and implemented their EMS in distinct phases:

PHASE I
▪ Appointment of a project manager to lead the effort
▪ Confirmation of top management support/buy-in
▪ Selection of an EMS Implementation Team
▪ Selection of an EMS Core Team
▪ Selection of an EMS Fenceline
▪ Development of an Environmental Management Policy for the EMS
PHASE II
▪ Trained EMS Implementation Team (Environmental Aspects, Objectives and Targets)
▪ Identified Environmental Aspects/Impacts
▪ Developed criteria to evaluate Environmental Aspects/Impacts
▪ Selected Significant Environmental Aspects/Impacts
▪ Identified Legal and Other Requirements
▪ Developed a written standard for EMS Definitions
▪ Developed a written standard for Environmental Policy
▪ Developed a written standard to identify/evaluate Aspects/Impacts and select Significant Aspects/Impacts
▪ Developed a written standard to identify Legal and Other Requirements
▪ Developed a written standard for Objectives and Targets
▪ Developed a written standard for Environmental Management Program
▪ Developed a written standard for Structure and Responsibility
PHASE III
▪ Completed Objectives and Targets
▪ Completed EMS Implementation and Operation Controls
▪ Drafted and completed EMS standards that meet the ISO 14001 Standard
▪ Conducted an Internal Audit
Phase IV
▪ Completed Corrective Actions
▪ Conducted a Management Review
▪ Determine preparedness for third party verification audit

OUTREACH Natick has utilized the following main strategies to promote their environmental efforts and meet the ISO 14001 Standard:

1) *EMS Website*: Natick has posted background information on all EMS elements to the Town of Natick website. Under the Department of Public Works pages, the public can find descriptions of implementation approaches and activities, copies of the related environmental policies, a list of aspects and targets, and audit information. The webpages are consistently maintained and updated, providing a central source of EMS information for both internal and external purposes: http://natickma.virtualtownhall.net/Public_Documents/NatickMA_PubWorks/EMS

2) *Pollution Prevention Plan and Project Updates:* Due to the November 2001 U.S. EPA Consent Decree, the Town of Natick was required to complete a

Supplemental Environmental Project which included preparation of a Pollution Prevention Plan. As the Town has approached completion of the 3-year enforcement action they produced a Pollution Prevention Project Benefits compilation table to communicate their performance.

3) ***Annual Environmental Compliance Report:*** The Town has completed Annual Environmental Compliance Reports since 2002 providing the public with a status of compliance audits, pollution prevention projects, and related benefits to the Town. The latest Report, for 2004, is publicly available at http://natickma.virtualtownhall.net/Public_Documents/NatickMA_EnvComply/Annualreport2004.

RESOURCES REQUIRED TO IMPLEMENT/MAINTAIN THE EMS One complete cycle of EMS implementation (policy to internal audit) required Natick to commit approximately 1,000 total direct labor hours, in addition to their regular duties, at a cost of approximately $30,000 in direct labor costs and $20,000 in consultant services. Bob Bois, the EMR, estimates that he logged a significant portion (~50-60%) of the overall direct labor working individually with a consultant to develop draft procedures and approaches, which were then reviewed and implemented by the Team. Overall, Mr. Bois estimated that he spent approximately 20% of his time on EMS implementation activities, with the remainder dedicated to other responsibilities as Town Compliance Officer and Conservation Agent.

3RD PARTY VERIFICATION The Town of Natick is planning to seek third party ISO 14001 certification for its EMS upon completion of treatment plant upgrades. Based upon the results of their internal "dress rehearsal" audit conducted in December 2004, the Town is targeting late 2005 for the 3rd Party Verification Audit.

The Town believes that third party registration will provide an additional level of motivation and accountability. Once the organization obtains registration, no one will want to let it slip away especially under the watchful public eye. In addition, ISO registration

> *"The Town took a big public image hit with the U.S. EPA Consent Decree. When I initially highlighted the strengths of EMS as a sound approach, ISO 14001 certification really appealed to our Public Works Director. He replied that he had seen a number of companies waving their ISO flags and said he wanted Natick to do the same".*
>
> Bob Bois
> Environmental Compliance Officer and EMR

will ensure the long-term vitality of the EMS giving the system a higher level of resilience through the organizational changes that invariably occur.

Based on the costs incurred by other local governments and initial estimates, Natick projects the registration process will cost approximately $5,000 for the initial registration audit and surveillance audits for one-year.

BARRIERS/LESSONS LEARNED/KEYS TO SUCCESS Due to a committed EMR serving as the EMS champion, participation in

the Municipal Stewardship Program, and the assistance of a knowledgeable and experienced consultant, Natick's EMS was implemented and institutionalized relatively efficiently, with only limited bumps in the road.   The following are barriers, lessons learned, and keys to success as defined by Natick personnel:

Top 3 Keys to Success

1. External program participation – participating in the Municipal Stewardship Program was a motivator and allowed for technical assistance.

2. Proven templates – the ability to leverage practitioner tools allowed its team to translate concepts and programs into a usable structure.

3. Technical assistance – Our technical assistance consultant provided EMS implementation experience combined with water systems knowledge, which helped guide our team through trouble spots and bridge the knowledge gap among our team members to help them understand how EMS elements related to their actual daily activities.

Top 3 Barriers

1. Consistent meeting times – water operations are 24/7, thus it was difficult to bring together requisite team members and ensure effective communication.

2. EMS understanding – personnel had very limited upfront knowledge of the EMS process, thus significant amount of the work was handled by the EMR.

3. Development of plans – the creation of environmental management plans to clearly identify a path for meeting targets could have been more effective early on. This component was not given the original attention that it deserved.

Top 3 Lessons Learned

1. Remember that the basis of an EMS is continual improvement. The EMS should promote performance, but an organization must also be realistic about what it can reasonably achieve with each cycle.

2. It is unlikely that an organization can implement an EMS completely from scratch without relying upon outside examples and experiences. Developing one's own templates, techniques, strategies, without sourcing suggestions, concepts, experiences from other practitioners, would be significantly inefficient and potentially overly burdensome. Don't reinvent the wheel.

3. Stay away from "ISO-ese". Translate the EMS jargon so that the workforce can clearly understand it and apply it to their everyday activities.

NEXT STEPS Natick will continue developing its EMS and advance its environmental targets. Currently, the Town is planning to seek third party certification for its EMS through ISO 14001 registration upon completion of treatment plant upgrades. The target timeframe is late 2005.

Looking towards the future, Natick has incorporated EMS expansion plans into their 5-year planning process for DPW that begins next year. The Town has considered expansion of their EMS to include other divisions within the Department of Public Works, including Vehicle Maintenance. However, the decision has been made to first complete necessary treatment plant upgrades, ensure that requisite adjustments are made under their EMS, and then seek third party certification for the EMS within the existing fenceline. After obtaining certification, the decision to expand their EMS will be re-visited.

ADDITIONAL INFORMATION For additional information on Natick's EMS experience and progress, please contact:

Bob Bois
13 East Central St
Natick, MA 01760
508-647-6452
bbois@natickma.org

In addition, the Town of Natick maintains up-to-date webpages devoted solely to their EMS implementation:
http://natickma.virtualtownhall.net/Public_Documents/NatickMA_PubWorks/EMS

EMS CASE STUDY #3

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY
Delaware No. 1 Water Pollution Control Facility

Organizational Profile/Background Camden County is located in the southwestern portion of New Jersey, across the Delaware River from Philadelphia. The County is 226 square miles in area, with a population of about 500,000. There are thirty-seven municipalities in Camden County.

The Camden County Municipal Utilities Authority (CCUMA) treats 58 million gallons of sewage per day at two plants, the Delaware No. 1 Water Pollution Control Facility and the Winslow Water Pollution Control Facility. This flow travels through 90 miles of pipe assisted by 25 pump stations. Partnering with the Winslow, New Jersey Facility, operations help serve the County's population of 500,000 and City of Camden sanitary sewage and stormwater.

CCMUA was required to construct these facilities as a regional wastewater treatment system by the U.S. EPA to bring Camden County into compliance with the Federal Clean Water Act. Before this regional wastewater treatment system was constructed to replace aging and overburdened infrastructure, it was estimated that 45 million gallons per day of inadequately treated sewage was discharged into the lakes and streams of Camden County. CCMUA has 145 employees overall, including the treatment plant, sewer collection system, and administration.

EMS FENCELINE SELECTED Camden County selected its Delaware No. 1 Water Pollution Control Facility (Delaware No. 1 WPCF) for its EMS "fenceline" and began implementation in February 2000. This facility is New Jersey's fourth-largest wastewater treatment plant with a design capacity of 80 million gallons per day, and a hydraulic capacity of 160 million gallons per day. The facility treats sanitary sewage from Camden County and the city of Camden, as well as stormwater from Camden City.

The plant incorporates primary and secondary treatment of wastewater prior to discharge to the Delaware River. Sludge thickening is accomplished using belt filter presses, which result in the generation of approximately 1,200 tons per week of sludge cake at 26-27% solids. Sludge is currently disposed of at incineration and composting facilities in Burlington and Gloucester Counties, but the CCMUA is currently in the process of installing new sludge drying facilities at the plant.

KEY REASONS FOR IMPLEMENTING AN EMS Camden County decided upon an EMS as part of a commitment to control and optimize its water quality, odor control, and costs while meeting the needs of the environment, employees, ratepayers, and the local community. An EMS allowed the County to strategically and efficiently fulfill this commitment for the long-term and

identify opportunities for improvement.   In the middle 1990's, CCMUA faced significant privatization pressure, punctuated by the first rate increase in nine years and an external study citing inefficiencies in maintenance and operation. In addition, CCMUA was sued by a citizens group and the New Jersey Department of Environmental Protection over odor complaints.

In response to the formal odor lawsuit and external pressures, CCMUA hired a consultant to assess operations and develop an operational plan to reduce odors at the plant and increase efficiency. To accomplish this, CCMUA entered into a formal Consent Decree to work directly with the New Jersey DEP, with an understanding that the formal lawsuit would be dropped. Based upon desired organizational and operational changes, CCMUA and the New Jersey DEP agreed that an EMS was the logical approach. CCMUA decided to implement an EMS in conformance with the U.S. EPA National Enforcement Investigations Center (NEIC) Compliance-focused EMS-Enforcement Agreement Guidance.

> CCMUA examined the City of San Diego's Metropolitan Wastewater Department's positive experience with EMS in making their decision. San Diego's Operation and Maintenance Division achieved ISO 14001 certification in 2003. For additional information, please visit www.peercenter.net.

During the case study interview, Andy Kricun, the Deputy Executive Director and EMS Program Manager (see EMR Profile below) defined several drivers for why he championed the EMS approach for Camden County:
  ➢ An EMS provided a more systematic, proven approach;
  ➢ The EMS approach complemented then current activities and provided a "stamp of authenticity" for the Board;
  ➢ CCMUA was facing pressure to increase performance and reduce operational budget; and
  ➢ The Authority needed a means to proactively address community odor complaints.

EMS CORE TEAM STRUCTURE Camden County's EMS Steering Committee is made up 7 members, including select managers and employees. The EMS Steering Committee is led by the EMS Program Manager, who is also the Deputy Executive Director of CCMUA, and has the full support of the CCMUA Board of Commissioners. The Committee was purposefully heavy on the management side because significant organizational and operational change was required. Members were appointed by Top Management and the Board. The EMS Steering Committee assumed much of the responsibility and provided the internal catalyst for sustained EMS development activities.

Camden County selected Andrew Kricun, Deputy Executive Director and Chief Engineer, to lead the EMS implementation and serve as Environmental Management Representative (EMR). Mr. Kricun has twenty years of experience in environmental engineering and management.   He graduated with honors from Princeton University with a degree in Chemical Engineering. Mr. Kricun is a licensed civil engineer and a member of the Water Environment Federation's EMS Committee.

The following EMS chart details the basic team structure:

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┌─────────────────────────────────────────────────┐
│            CCMUA Board of Commissioners          │
└─────────────────────────────────────────────────┘
            ↓                           ↑
┌─────────────────────────────────────────────────┐
│         EMS Management Representative            │
│       Deputy Executive Director/Chief Engineer   │
└─────────────────────────────────────────────────┘
            ↓                           ↑
┌─────────────────────────────────────────────────┐
│              EMS Steering Committee              │
│  Director of Operations and Maintenance    Chief Financial Officer │
│  Chief Operator   Chief of Regulatory Compliance   Chief of Maintenance │
│     Assistant Director of Operations and Maintenance │
└─────────────────────────────────────────────────┘
            ↓                           ↑
┌─────────────────────────────────────────────────┐
│          All Employees within the Organization   │
└─────────────────────────────────────────────────┘
```
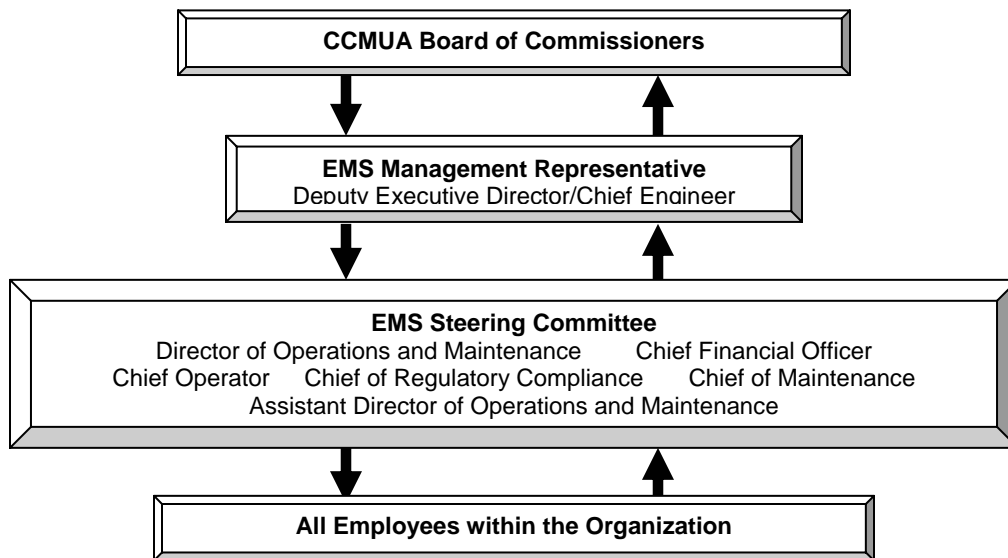
ENVIRONMENTAL POLICY Camden County chose to adopt an Environmental Policy as part of their initial EMS implementation efforts. The EMS Team and County representatives felt that passing this resolution was critical to ensuring the full support and commitment of the organization top-down, bottom-up.

CAMDEN COUNTY ENVIRONMENTAL POLICY STATEMENT

The mission of the Camden County Municipal Utilities Authority is to be committed to our customers, to the betterment of public health and to do our utmost to contribute to better air and water quality through the optimal operation of our wastewater treatment systems. The CCMUA will accomplish its mission through a proactive and determined commitment to:

- Continuous compliance with all applicable environmental regulations, standards and permits
- Continual optimization of wastewater treatment operations
- Continual optimization of odor control performance
- Communication of these goals to our employees, to our customers and our neighbors

Adopted by CCMUA Board of Commissioners and its members on June 19, 2000.

SIGNIFICANT ASPECTS & IMPACTS Camden County followed the U.S. EPA Compliance-focused EMS (CFEMS) model and guidance to assess and prioritize operations and activities that have an environmental impact.   The CFEMS guidance states that organizations implement a:

"process for identifying operations and waste streams where equipment malfunctions and deterioration, operator errors, and discharges or emissions may be causing, or may lead to: 1) releases of hazardous waste or other pollutants to the environment; 2) a threat to human health or the environment; or 3) violations of environmental requirements".

> "In the past, if anyone mentioned odor complaints the comments would have been dismissed with little attention. Since the EMS process and associated organizational changes, employees react much differently because they understand the importance of addressing community issues".
> - Andy Kricun, Deputy Executive Director, CCMUA

To accomplish this step, CCMUA hired the consultant Camp Dresser & McKee Inc. to conduct an assessment of operations and develop a list of inefficiencies and ineffective operations, as well as a plan for how to address each. CCMUA's EMS Steering Committee discussed the list and ranked the items according to environmental, safety and health, community, and budgetary impact.

EMS Areas of Focus
1. Optimizing water quality
2. Optimizing odor control performance
3. Minimizing cost without sacrificing progress on the top two areas of focus

EMS OBJECTIVES, TARGETS, AND PROGRAMS

Based upon the EMS Areas of Focus, CCMUA is working towards the following environmental targets, with example programs and key activities:

1. **Maintain suspended solids and Biological Oxygen Demand (BOD) below 20 ppm, with a target of below 15 ppm.**
   - Improvements to sludge thickening and dewatering capability in order to remove sludge efficiently. CCMUA believes that this action was the most important for improving water quality performance.
   - Improvements to primary and final sedimentation tanks.
   - Internal emphasis on performing beyond permit levels.

2. **Complete elimination (100%) of offsite odors.**
   - Installed new chemical scrubber at plant headworks
   - Installed new biofilter at plant headworks
   - Installed new carbon filter for scum concentration
   - Initiated a Zero Tolerance Program for odor control

3. **Maximal capture of we weather flow, without adversely impacting water quality.**

4. **Increased cost savings**

BENEFITS OF ADOPTING AN EMS

Cost Savings
➢ 25% reduction in operations and maintenance costs (includes treatment plant and collection system) from $21.2 million in 1996 to $16 million in 2000.
➢ 6% lower rate than in 1996, with three separate rate reductions in 10 years. CCMUA has held its rate for 10 straight years and are on target to hold the rate for an eleventh in 2006.

Improved Compliance
➢ Regularly discharging effluent that ranges from 12-18ppm, having struggled in the late 1990's to meet 30 ppm limits on a consistent basis.

Increased Operational Consistency and Efficiency
➢ Reduction of wet weather bypasses from 24 in 1999 to 2 over the last 6 years.
➢ 25% increase in tonnage of sludge removed from the plant from 46,000 tons per year in 1999, to 55,000 tons in 2000, to 60,000 tons currently.

Enhanced Public Image
➢ 90% reduction in verified odor complaints from 16 in 1997-1998 to 2 in last 6 years. Initiated a Zero Tolerance Program for odor control to completely eliminate offsite odors.
➢ Implementation of New Jersey Department of Environmental Protection (NJDEP) approved community notification system that provides the neighboring community with 24-hour telephone access for reporting odor concerns. The hotline provides real time community input to CCMUA's EMS.

IMPLEMENTATION STRATEGY AND TIME FRAME

Camden County designed their EMS implementation, beginning in February 2000, based on the U.S. EPA National Enforcement Investigations Center (NEIC) Compliance-Focused Environmental Management System (CFEMS) Enforcement Agreement Guidance 12 Key Element approach. The CFEMS model is intended to supplement, not replace, EMS models developed by voluntary consensus standards bodies, such as ISO 14001. The model incorporates the standard "plan, do, check, and act" approach. The CFEMS model is based upon the following 12 Key Elements:

1. Environmental Policy
2. Organization, Personnel, and Oversight of EMS
3. Accountability and Responsibility
4. Environmental Requirements
5. Assessment, Prevention, and Control
6. Environmental Incident and Noncompliance Investigations
7. Environmental Training, Awareness, and Competence
8. Environmental Planning and Organizational Decision-Making
9. Maintenance of Records and Documentation

10. Pollution Prevention Program
11. Continuing Program Evaluation and Improvement
12. Public Involvement/Community Outreach

For additional information and guidance on the CFEMS model, please visit:
http://www.epa.gov/compliance/resources/publications/incentives/ems/ems12elemr.pdf

OUTREACH   Camden County has utilized the following main strategies to promote their environmental efforts and meet the ISO 14001 Standard:

1) *EMS Website***:** Camden County has posted background information on all EMS elements to the County's website, including background information on how the team approached each implementation element. The webpages are consistently maintained and updated, providing a central source of information for both internal and external purposes: http://www.ccmua.org/emstoc.html.

2) *Quarterly Billing Insert:* Includes cost savings initiatives that directly impact rate payers and the local community, as well as information on water quality and related performance.

3) *Citizens Advisory Board:* The Board was originally developed in response to the odor issues and rate increase that occurred in the later 1990's. Since both of these issues have since been adequately addressed and maintained, the Board is less active currently.

RESOURCES REQUIRED TO IMPLEMENT/MAINTAIN THE EMS   CCMUA's EMS goals correspond completely with the organization's overall goals; therefore, it is nearly impossible to differentiate general operations and maintenance costs from direct labor resources for EMS. CCMUA views EMS as a means to improve progress towards meeting organizational goals, so the labor resources used for EMS are "sunk" costs (i.e., would expend these resources regardless), not a marginal cost. The EMS allows CCMUA to target resources more effectively, strategically, and with greater return on investment. Overall, CCMUA's Deputy Executive Director estimates that he spends approximately 70% of his time on EMS-related issues.

3RD PARTY VERIFICATION   Camden has conducted internal audits, but consciously made the decision as an organization that external verification and registration is not worth the time and monetary investment for their organization at this time.

BARRIERS/LESSONS LEARNED/KEYS TO SUCCESS

Keys to Success

1. It is critical to have defined plans with accountability for performance and ultimately results. At each meeting, it was important to formalize actions, responsibilities, and timelines for important activities. This allowed our team to stay focused and maintain progress towards achieving goals. Otherwise, it is very easy to bottleneck and let important actions slide, especially against competing responsibilities and projects.

2. Persistent follow-up to make sure plans are being implemented efficiently and effectively. Our teams discovered that one way to shorten meetings and gain recognition was to remove items from the "problem area" or "outstanding item" lists. This was especially true as responsibilities were defined and employees did not want to be held accountable for on-going issues.

3. Building off the above keys to success, it was important to "memoralize" meetings by producing and distributing notes. The result is a documented acknowledgement of responsibilities, which holds direct accountability for subsequent meeting follow-up. This kept the CCMUA team focused on progress and ensured that everyone was on the same page and understood expectations and milestones moving forward.

 Top 3 Barriers

1. EMS was a relatively new and innovative approach, thus had to be sold throughout the organization. When CCMUA began EMS implementation, case studies and practical examples were limited since the ISO 14001 Standard was only a couple of years old. Comparatively, there is a wealth of information and "assurances" that the process can be utilized effectively within the wastewater sector.

2. Feeling that public sector organizations are limited and that there are no "carrots" for employee motivations and buy-in. This barrier is often encountered in public agencies as efficiencies do not always translate into budget allocations and employee incentives or rewards. There is a need to be creative in motivating teams and the organization, especially with a program of continual improvement.

3. Achieving a comfort level with the program whereby employees would feel their ideas are listened to. Many organizations encounter initial resistance with any new program or approach, as employees and stakeholders take a "holding pattern" position until they feel comfortable with how an initiative positively or negatively impacts their position. With EMS, jargon is also an initial barrier as most people don't feel comfortable until they achieve a working understanding of an approach.

 Top 3 Lessons Learned

1. Stay persistent and hold teams and/or team members accountable for defined responsibilities and action plans. As mentioned previously, make sure that tasks and action items are assigned leads and that there is accountability to ensure follow up.

2. Not the same drivers as in the private sector, thus need to adapt business case and consider rate payers. Often times organizations embrace an EMS or similar approach but do not give adequate time to capturing and communicating performance benefits.

3. Don't overlook the wealth of knowledge and experience internally within your organization.   We realized after initial meetings that our internal personnel had years and years of technical experience and had a more thorough understanding of actual day-to-day operations than nearly anyone we could bring in externally. This provided a real "grounding" mechanism for any changes that our team considered.

NEXT STEPS   Camden County will continue to maintain their EMS and seek opportunities for continued improvement. Currently, the county is assessing the potential for either expanding their EMS to include the interceptor system following the U.S. EPA Capacity, Management, Operations, and Maintenance (CMOM) principles as they are specifically designed for this component of the system.

In addition, Camden County will look to document more of their efforts and resulting procedures to capture much of the institutional knowledge and experience gained. Often times this is an extremely valuable benefit of EMS as an approach, since many municipalities ultimately face significant turnover with retirement of key personnel and operators with years of experience. In Camden County's case, the Authority estimates that 80% of the workforce has at least 15 years of experience.

ADDITIONAL INFORMATION   For additional information on Camden County's EMS experience and progress, please contact:

Andrew Kricun
Deputy Executive Director
1645 Ferry Avenue
Camden, New Jersey 08101
(856) 541-3700, ext 1223
andy@ccmua.org

In addition, the Camden County maintains up-to-date webpages devoted solely to their EMS implementation http://www.ccmua.org/emstoc.html.

EMS CASE STUDY #4

OAKLAND COUNTY DRAIN COMMISSIONER'S OFFICE
Wastewater Treatment Complex – Waterford, Michigan

Organizational Profile/Background The Oakland County Drain Commissioner's Office is charged with the responsibility of meeting Storm water regulations as a subset of the Federal Clean Water Act. Through this program, the Drain Office offers programs to address water pollution challenges through watershed-based planning, public education, and illicit discharge detection activities. There are 61 cities, villages and townships in Oakland County. Many of them look to the Drain Commissioner's Office to provide a myriad of services. When requested by local communities, it's the drain commissioner's job to serve as the facilitator for new construction projects whether they're drains, sewers, or a new water supply system. The Drain Office supplies project management for the planning, reviewing and financing through final construction.

The Oakland County Drain Commissioner's Office also operates and maintains municipal water and sewer systems, wastewater treatment plants along with retention and treatment facilities. This is all done at the request of various municipalities within the county. In addition, the Drain Office serves as a valuable information resource for water and sewer systems. Every task, from maintaining storm drains and sanitary sewer systems, to reading meters, inspecting fire hydrants, and repairing water main breaks, mandates that a highly trained staff, armed with specialized equipment, can do the job. Some tasks, such as fixing a break in a water main, require immediate attention. Oakland County residents expect a prompt response from employees who are on call 24 hours a day, seven days a week, regardless of the weather.

The Drain Office derives its broad powers and responsibilities via several state and federal laws. Its primary duties are described in a statewide law: the Michigan Drain Code, Act 40 of 1956, as amended. Additional powers and duties of the Drain Commissioner derive from the provisions of two Public Works Acts, Act 342 of 1939 and Act 185 of 1957; the Subdivision Control Act, Act 288 of 1967, as amended, the Environmental Protection Act, Act 451 of 1994, as amended, including Part 91, Soil Erosion and Sedimentation Control, Part 307, Inland Lake Levels, and Part 309, Inland Lake Improvements; and various other statutes.

The Oakland County Drain Commissioner's Office is committed to providing water quality through a superior system of storm water drainage and sewage disposal systems while offering the assurance of a quality drinking water supply system necessary to sustain and promote the county's growth potential. When it does that, it contributes to the high quality of life Oakland County residents have come to enjoy and expect.

NATIONAL PILOT PROJECT PARTICIPATION The Oakland County Drain office decided to implement its EMS through the *3rd EMS Initiative for Public Entities*, a U.S. EPA-supported national pilot

project facilitated by the Global Environment & Technology Foundation (www.getf.org). Since August 1997, 32 public entities have benefited from environmental management system (EMS) implementation thanks to their participation in three "EMS Initiatives for Local Government Entities" initiatives. The initiatives were made possible through a cooperative agreement between the U.S. Environmental Protection Agency (EPA) and the Global Environment & Technology Foundation (GETF). The initiatives tested the applicability and benefit of an EMS on environmental performance, pollution prevention, and stakeholder involvement in government operations. Participant organization have included ports, universities, utilities, wastewater treatment, and others further promoting EPA's overall policy to actively promote adoption of EMSs in key sectors. For more information on these initiatives please visit www.getf.org/projects/muni.cfm.

EMS FENCELINE SELECTED The Oakland County Drain Office selected to implement the EMS across the entire organization from the very beginning, believing that the organization could leverage its ISO 9001 Quality Management System and integrate the EMS in a single "pass". The organization includes approximately 260 employees dispersed among 20 units. There are two central Divisions: Engineering & Construction and Operations & Maintenance. The EMS fenceline includes the following central activities and sites:

- ✶ Project Management, Regulatory Review, Environmental Stewardship, Operations and Maintenance service for Storm Drains, Sewers, Water supply, Wastewater Treatment, and Administration.

- ✶ Commerce Wastewater Treatment Plant, George W. Kuhn Retention Treatment Basin, Pump Maintenance Facility, Walled Lake/Novi Wastewater Treatment Plant and Water Maintenance Facility.

KEY REASONS FOR IMPLEMENTING AN EMS The primary goals of the Oakland County Drain Commissioner's Office are to improve employee awareness of environmental issues while building a positive working relationship with federal and state agencies. While the Drain Commission has prided itself in being environmentally sensitive, it is convinced that adopting an EMS and recently becoming certified to the ISO 14001 has helped improve

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OAKLAND COUNTY EMS ORGANIZATIONAL GOALS

- ➢ To improve employee awareness of environmental issues, responsibilities and to improve both internal and external communication to ensure that employees and customers are kept informed of environmentally sound practices already in place.
- ➢ To build positive working relationships with federal and state agencies to ensure that compliance issues are addressed quickly and forthrightly with an eye toward continual improvement.
- ➢ To preserve and protect the quality of the environment in areas where we have jurisdiction and to promote the preservation and protection of areas where we have no jurisdiction by promoting education and awareness of sound environmental practices.
- ➢ To implement Best Management Practices throughout the organization to improve efficiency and implement cost savings where practical.
- ➢ To improve employee morale and, by extension, improve our public image through improved communication and cooperation with outside agencies and the public to increase awareness of our jurisdictional limitations.
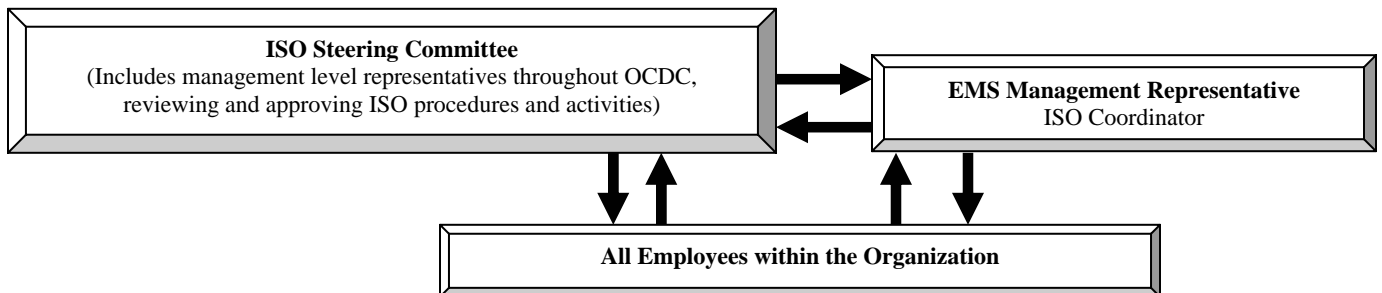- ➢ To continue to conform with ISO 14001 standards.

on past success in the environmental arena while, at the same time, making a positive impact on helping customers.

EMS CORE TEAM STRUCTURE

The EMS core team is made up of five members, with the ISO Coordinator designated as the EMS Project Manager or "Environmental Management Representative". The initial EMS Core Team was selected based upon their role as the ISO 9001 Steering Committee members and working knowledge of management systems approach. Top management is actively involved in all core team activities.

Oakland County selected Sherri Gee, ISO Coordinator, to lead the EMS implementation. Ms. Gee joined OCDC in January 2002 to assist the organization in implementing the ISO 9001 management system. Ms. Gee has previous experience implementing an ISO 14001 management system in the automotive industry.

The following EMS chart details the basic team structure:

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┌──────────────────────────────────────┐        ┌──────────────────────────────┐
│      ISO Steering Committee          │  ───►  │ EMS Management Representative │
│ (Includes management level           │        │        ISO Coordinator        │
│ representatives throughout OCDC,      │  ◄───  │                              │
│ reviewing and approving ISO          │        │                              │
│ procedures and activities)           │        │                              │
└──────────────────────────────────────┘        └──────────────────────────────┘
                  │  ▲              │  ▲
                  ▼  │              ▼  │
        ┌──────────────────────────────────────┐
        │   All Employees within the Organization │
        └──────────────────────────────────────┘
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ENVIRONMENTAL POLICY

The Oakland County Drain Commissioner's Office had a Quality Policy in place when it initiated the Environmental Management program. To avoid confusion and provide for true integration, the OCDC used the existing Quality policy and added a few key elements to fit its environmental objectives and to harmonize with the existing Mission Statement. Additions to the original policy include a commitment to continuous improvement and pollution prevention.

QUALITY POLICY

We are committed to excellence and providing progressive solutions by utilizing quality objectives and sound environmental practices. Our organization has pledged a commitment to maintain management practices that ensure continuous improvement and the prevention of pollution. We will set goals that encourage efforts to meet or exceed local, state and federal water quality standards and environmental requirements within our control.

MISSION STATEMENT

The Oakland County Drain Commissioner's Office is dedicated to the principles of integrity and professionalism, and to the preservation and protection of public health, welfare, convenience and the citizens' right to quality water.

We are committed to providing our customers with services of high value, that are fairly priced and environmentally sound.

In our quest for excellence it is imperative that each member of our staff reacts to the problems of the public promptly, with sensitivity and respect. In addition, we will endeavor to provide an appropriate resource when a problem is not within our authority.

It is our desire to instill a culture that perpetuates an environment promoting trust, respect and teamwork.

8/20/03

OCDC

SIGNIFICANT ASPECTS & IMPACTS The Environmental Aspect and Impact element of EMS implementation is the step where organization's asses the operations, services, and activities within its EMS fenceline and identify how each positively and/or negatively affects the environment. The result is most commonly a list of environmental aspects (how an organization interacts with the environment – air emissions) and impacts (actual impact on the environment – degradation of air quality) that helps an organization visualize its "environmental footprint" and focus in on the most significant impacts. OCDC utilized a systematic approach to identifying its significant aspects and impacts, which included shared responsibility. The OCDC took the following steps in the aspect identification process:

1. Each Unit Supervisor was tasked to identify activities that occurred under his/her direction. In doing so, each manager was asked to fill out an Input/Output diagram (see Appendix A) for each central activity. This approach allowed for easy identification of impacts, waste, and byproducts. Unit Supervisors used operations personnel to assist in preparation of the I/O charts because they are the people that conduct activities and know them "in and out".

2. The ISO Steering Committee identified the following criteria to determine significance:

   ➢ Regulated
   ➢ Concerns Interested Parties
   ➢ Human Health & Safety
   ➢ Natural Resources
   ➢ Water Quality

3. The significance criteria were rated by each Unit Supervisor and their operators as follows and documented on an Environmental Impact Form (see Appendix B):

   Severity (0=none, 1=low, 3-medium, 5=high)
   Occurrence (0=no impact, 1=seldom, 3=occasionally, 5=often)
   Detection (0=n/a, 1=Excellent controls in place, 3=some controls in place, 5=no controls in place)

<center>

(Severity + Occurrence) x Detection = Total

</center>

4. Information from the Input/Output Diagrams and Environmental Impact Form are entered into a database maintained by the ISO Coordinator.

5. Adding the individual scores resulted in a single total score for each activity. For example:

Unit	Activity	Regulated	Interested Parties	HH & Safety	Nat'l Resources	Water Quality	Total
Maintenance	Water Main Break	6	10	50	50	25	141

6. The ISO Steering Committee reviewed the final rankings and determined significance as:

> ➢ Activities within the top three highest scores.
> ➢ Activities affected by any new regulations.

7. Based upon the total scores, following are OCDC's initial significant aspects:

Environmental Aspects
Sewer System Overflows
Septage Unloading Facilities
Maintaining and Installing Meters
Soil Erosion

EMS OBJECTIVES, TARGETS, AND PROGRAMS Based upon the identification of significant environmental aspects, OCDC developed the following Objectives, Targets, and Programs to promote and measure environmental performance taking into account:

*   ✶ Significant Aspects
*   ✶ Legal and other requirements
*   ✶ Best available technology
*   ✶ Business requirements
*   ✶ Cost
*   ✶ Interested parties
*   ✶ Employee health and safety

Objective: Reduce high dosage chlorine flushed into waters of the states from OCDC operation and maintenance activities.

Performance Indicator: Concentration of chlorine in discharge.

Target	Program(s)
By developing new standards by June 2005 and by revising OCDC chlorination procedures for disinfection.	1) Collect and analyze chlorine residual data from OCDC O&M activities. 2) Research current and potential new methods for disinfecting water systems. 3) Review existing O&M standards, regulations and procedures 4) Recommend new O&M standards and procedures. 5) Change current OCDC O&M standards and procedures.

Objective: Reduce the amount of paper used and increase the percentage of cardboard and batteries recycled.

Performance Indicator: Amount of paper purchased and average weight of batteries and cardboard recycled.

Target	Program
50 percent within two years.	1) Identify baselines for each item (paper, cardboard, batteries) 2) Review current paper recycling process. 3) Implement two-sided copying standard 4) Implement battery and cardboard recycling at all locations 5) Educate employees to gain involvement

Objective: Reduce potential for unnecessary inflow and infiltration in the Clinton/Oakland interceptor system.

Performance Indicator: Number of sub-standard manholes repaired vs. total number of sub-standard manholes.

Target	Program
Repair all sub-standard manholes by December 2005.	1) Effect and complete a manhole inspection program for the entire Clinton-Oakland Sewer Delivery System 2) Prepare a report that identifies the scope of work. 3) Conduct repairs based upon the inspections. 4) Prepare a final report that indicates the completion of the project.

Objective: Reduce potential for sewer system overflows and unnecessary inflow and infiltration in the Evergreen-Farmington Sewage Disposal System.

Performance Indicator: Number of sub-standard manholes repaired vs. total number of sub-standard manholes.

Target	Program
Rehabilitate all sub-standard floodprone manholes by December 2005.	1) Prepare a report that identifies the scope of work. 2) Conduct repairs based upon the scope of work. 3) Prepare a final report that indicates the completion of the project.

BENEFITS OF ADOPTING AN EMS

Enhanced Public Image

It is important for the public to understand that both their tax dollars and the money they pay in rates for water and wastewater services are being well spent. In addition to

observing sound business practices, the public is better served if those practices are incorporated with a proactive program to protect and preserve our precious natural resources. By embracing the tenants of EMS, we have been able to protect what we have, restore what we've lost and share what we've gained.

Sanitary Sewer Overflow Reduction

An important part of our daily responsibilities is the reduction of inflow and infiltration. By constructing a major addition to a combined sewer overflow basin in Madison Heights we have satisfactorily addressed residential concerns. The capacity of the basin was increased from 60 million gallons to 90 million gallons at a cost of some $140 million dollars. Not only does this represent a significant financial commitment, it shows that our commitment to environmental protection goes far beyond mere hype.

Employee Awareness

We are proud of the fact that OCDC employees display an uncompromising dedication to their work. They are hard-working and conscientiously serve the residents of Oakland County. They are our ambassadors in the field and are the ones who meet with our customers face-to-face on a daily basis. Their enthusiastic support of EMS has helped make their jobs easier and has increased their awareness of how their actions, and the actions of those they serve, impact the environment.

Streamlined Processes

Many of OCDC's processes were documented as a result of ISO 9001 implementation. The introduction of EMS identified some areas where original documentation was not coordinated between individual units. For example, OCDC had four work instructions for reporting and responding to sewer system overflows. Identifying this through our EMS allowed us to combine the work instructions into one procedure that clarified responsibilities for all involved throughout the organization.

IMPLEMENTATION STRATEGY AND TIME FRAME

As a participant in the 3rd EMS Initiative for Public Entities, OCDC followed a structured approach to EMS implementation. The basic approach was broken down into four distinct phases, with each phase requiring completion of detailed tasks and documentation over a 24-month period. The OCDC started implementation in January 2003 and completed its initial internal audit and management review in late December 2004. Oakland County's EMS was third-party verified in April 2005.

The following outlines the general EMS implementation process:

PHASE 1

January 2003 – May 2003
- EMS Awareness/Training
- Data Collection - Baselines
- EMS Fenceline definition
- Core Team formation
- Gap Analysis
- Document Management

PHASE 2

June 2003 – September 2003
- Environmental Policy
- Legal and Regulatory Requirements
- Significant Environmental Aspect Identification

October 2003 – March 2004
- Establishing Objectives & Targets
- Environmental Management Programs (top management to attend)

PHASE 3

PHASE 4

April 2004 – December 2004
- Monitoring
- Measuring
- Internal EMS Audit
- Management Review

RESOURCES REQUIRED TO IMPLEMENT/MAINTAIN THE EMS

Internal Labor -- One complete cycle of EMS implementation, over a 24-month period, required Oakland County to commit 2,646 total direct labor hours at a cost of approximately $130,559.   This number represents the direct labor hours employees performed in addition to their regular duties.

ISO Registrations and Audits – The Oakland County Drain Commissioner's Office received ISO 14001 registration in April 2005. The costs associated with the initial ISO 14001 external audit were approximately $8,000. The on-going registration maintenance and surveillance audits cost is expected to be $6,000 per year and will include both the ISO 14001 and ISO 9001 portions of the management system. OCDC will combine future external audits to cover both the quality and environmental portions of the management system at the same time. As a result, actual external audit fees may change.

THIRD PARTY VERIFICATION

OCDC verified its ISO 9001 management system through 3rd party registration in the fall of 2002. The external auditor assigned to OCDC for the initial registration was also qualified for ISO 14001 registration audits. Even though OCDC registered to the ISO 9001 management system first, it had always intended on implementing the environmental

component (ISO 14001) in the future. Therefore, the registration company, NSF-ISR, was originally chosen due to its experience in environmental fields.

> *"Third party verification confirms to the staff at OCDC as well as stakeholders and other county departments that our management system is in place and functioning as intended. Verification through an outside source gives credibility to our effort."*
>
> Sherri Gee
> ISO Coordinator

OCDC's experience with registering to ISO 14001 proved to be a far less bumpy road than for many new registrants. That can be attributed to the fact that many of our staff members already were familiar with the ISO registration process. They had experienced it previously in becoming certified to the ISO 9000 standard. As a result, much of the ISO jargon and the fundamental principles were seamlessly incorporated into the newly adopted environmental standard. In other words, staff members came with first-hand experience with external audits and were, as a result, far less intimidated by the process. There was, however, a bit of a struggle as the external auditor navigated between unique OCDC organizational terms and ISO jargon. Fortunately, our ISO Coordinator, Sherri Gee, was able to serve as a competent guide to keep the procedure on course. Further, utilizing the same registration company and the same auditor for both the ISO 9001 registration process and the ISO 14000 registration proved helpful because the external auditor was already knowledgeable about OCDC's organizational mandates and general business purpose and direction.

KEYS TO SUCCESS/BARRIERS/LESSONS LEARNED

Top Three Keys to Success

1. Taking the time to visit each of the facilities, meet with management and employees, and discuss the initial goals and objectives. This was effective in showing support and keeping everyone updated.

2. Effective communication. It is worth the time and effort to ensure that everyone has a consistent understanding of the system. This involved levels of employees.

3. Top management involvement in setting goals and defining environmental management programs.

Top Three Barriers

1. Selling the benefits of environmental responsibility to municipal customers.

2. Initial confusion associated with integrating management systems and initiatives. Many employees viewed early efforts as three separate initiatives (ISO 9001, ISO 14001, and EMS).

3. Managing resources was difficult because many employees faced "competing" responsibilities in addition to ISO implementation.

 Top Three Lessons Learned

1. Communicate early and often across all lines of the organization. Avoid early confusion.

2. Translate EMS terms into organization terms as much as possible, especially in the beginning.

3. Keep all employees involved throughout the goal setting process to ensure uniformity.

NEXT STEPS OCDC will continue to build upon its EMS experience with a particular emphasis on periodically reviewing its environmental goals. As technological advances become available, our staff will perform an appropriate evaluation to determine if they are appropriate to adopt and incorporate into our business practices. We are proud of the fact that this is an area where we have excelled. In fact, our office was able to convince both federal and state regulators that we could employ cost-saving measures in a more environmentally friendly manner to address a huge overflow challenge. The savings amount to more than $160 million and was cited as an international model for other communities.

OCDC's novel solution to a costly construction project that serves 15 communities earned Drain Commissioner John P. McCulloch an invitation to participate in the American Public Works Association's International Congress.

Said McCulloch, "We significantly reduced the costs by using existing system capacity while at the same time implementing new measures to reduce inflow and infiltration into the system. It's something we can be proud of. We knew we had a winner, now it has been acknowledged in an international forum.

In that same spirit, OCDC encourages all employees to continually evaluate current practices with an eye toward improvement. Although most won't result in multi-million dollar savings, even the smallest improvement, when taken collectively with many others, amounts to a significant contribution and results in greater environmental protection.

ADDITIONAL INFORMATION

For additional information on Oakland County's EMS experience and progress, please contact:

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EMS CASE STUDY #5

THE CITY OF LOWELL, MASSACHUSETTS
Regional Wastewater Utility

The City of Lowell is located in northeastern Massachusetts 12 miles from the Route 128 Beltway "America's Technology Highway." Less than two miles from the New Hampshire border and 25 miles from Boston, the City finds itself well-positioned in the center of the leading manufacturing region in Massachusetts. Manufacturing represents 32% of the jobs in the area with the majority found in the fields of plastics, high technology and medical technology. Based on the 1990 Census, Lowell has a population of 103,440 and occupies a land area of 13.4 square miles.

Lowell was incorporated as a township in 1826 and was later incorporated as a city in 1836. The City is governed by a nine-member elected City Council and a City Manager who is appointed by the Council. The Mayor is elected by the members of the City Council and serves as its presiding officer.

NATIONAL PILOT PROJECT PARTICIPATION The Lowell Wastewater Facility decided to implement their EMS through the *1st EMS Initiative for Local Governments 1997-1999*, a U.S. EPA supported national program facilitated by the Global Environment & Technology Foundation (www.getf.org). Since August 1997, 32 public entities have benefited from EMS implementation thanks to their participation in three *EMS Initiatives for Local Government Entities*. The initiatives were made possible through a cooperative agreement between the U.S. Environmental Protection Agency (EPA) and the Global Environment & Technology Foundation (GETF). The initiatives tested the applicability and benefit of an EMS on environmental performance, pollution prevention, and stakeholder involvement in government operations. Participant organization's have included ports, universities, electric utilities, wastewater treatment plants, and others further promoting EPA's overall policy to actively promote adoption of EMSs in key sectors. For more information on these initiatives please visit www.getf.org/projects/muni.cfm.

EMS FENCELINE SELECTED The Lowell Regional Wastewater Utility was selected by the city as the EMS Fenceline. It was chosen because of the environmental nature of its primary mission and the Department's progressive approach in searching out new methods to improve its operations. The Utility is an activated sludge wastewater treatment facility with a design flow of 32 million gallons a day (mgd) and an average flow of 30 mgd. In 1998, the facility produced approximately 23,540 wet tons of quality biosolid for land application or composting.

The facility provides primary and secondary treatment to more than 180,000 users located in five communities, Lowell included. The system includes 230 miles of sewer

lines, 5000 catch basins, and the same number of manholes. The facility is staffed with 46 employees.

KEY REASONS FOR IMPLEMENTING AN EMS   The Lowell Regional Wastewater Utility decided to participate in the national U.S. EPA supported EMS initiative because the facility had struggled with ongoing compliance issues, including a U.S. EPA Consent Order, and local community complaints concerning odors. In addition, the utility yearned to become an environmental leader within the region and saw EMS as the perfect opportunity to meet internal and external objectives.

LOWELL EMS IMPLEMENTATION DRIVERS

➢ Enhance City's overall image;
➢ Improve its environmental performance;
➢ Help lead the region's public sector toward compliance with the ISO standards through education, training and awareness; and,
➢ Maximize efficiency, reduce costs and avoid costly environmental emergencies thereby saving taxpayers money.
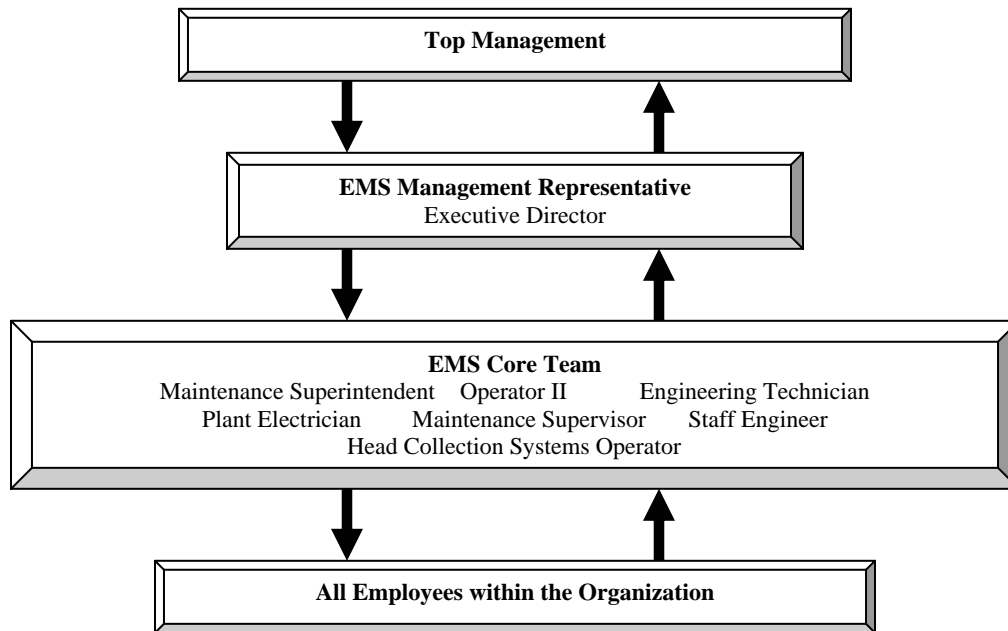➢ Be a model of municipal operation that is competitive, and even outperforms, private sector operations.

EMS CORE TEAM STRUCTURE   Lowell initially recruited personnel for their EMS Core Team by placing "teaser" posters about EMS in order to promote curiosity and interest. This also served as a valuable awareness building tool within the organization. Based upon responses and discussions, a volunteer Core Team of 14 members was developed with representatives of each division, including Operations, Maintenance, Engineering/Pretreatment, Laboratory, and Administration (see organizational chart on following page). The Core Team stuck to a bi-weekly meeting structure during implementation, and as the EMS has matured the team meets at key intervals (i.e., aspects review, audits, compliance assessments). Recently the team has met more often as they are updating their System to meet the new ISO 14001:2004 Standard. The Core Team includes the Executive Director, whom also serves as top management for the EMS efforts. Since the Executive Director is also the organization's original "EMS champion", the team is able to work autonomously in developing and working towards EMS goals.

Mark Young has over 26 years experience in the wastewater field as an Operator, Head Operator, Operations Superintendent and Executive Director. He holds a Grade 7 Massachusetts Operator Municipal and Industrial Wastewater License as well as a Grade 4 Wastewater Collection Systems License. Mr. Young is also a board member and one of the founders of NEBRA (New England Biosolids and Residuals Association), an organization of wastewater professionals that promote beneficial reuse of biosolids in New England.

The following EMS chart details the basic EMS team structure, which currently includes seven Core Team members with only one Core Team member in a management position:

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                    ┌─────────────────────────────────────┐
                    │           Top Management            │
                    └─────────────────────────────────────┘
                         │                        ▲
                         ▼                        │
              ┌─────────────────────────────────────────────┐
              │      EMS Management Representative          │
              │             Executive Director              │
              └─────────────────────────────────────────────┘
                         │                        ▲
                         ▼                        │
    ┌───────────────────────────────────────────────────────────────┐
    │                        EMS Core Team                          │
    │  Maintenance Superintendent   Operator II    Engineering Technician │
    │    Plant Electrician   Maintenance Supervisor   Staff Engineer │
    │            Head Collection Systems Operator                    │
    └───────────────────────────────────────────────────────────────┘
                         │                        ▲
                         ▼                        │
              ┌─────────────────────────────────────────────┐
              │      All Employees within the Organization   │
              └─────────────────────────────────────────────┘
```

ENVIRONMENTAL POLICY The Lowell Regional Wastewater Utility is committed to maintaining a clean, healthy Merrimack River by providing reliable wastewater treatment and collection service in an environmentally sensitive and responsible manner. To accomplish this, the utility is committed to continually improving and reassessing the EMS, which benefits the citizens and employees by contributing to the improvement of water resources and environmental health of the community. The utility developed the following policy to communicate this commitment:

EMS C.I.R.C.L.E

C.	Communication
I.	Improve continuously on our policy
R.	Reduce, reuse, and recycle, to prevent pollution
C.	Comply with environmental laws and regulations
L.	Long term commitment to a clean and healthy environment
E.	Educate the community

SIGNIFICANT ASPECTS & IMPACTS The environmental aspect and impact element of EMS implementation is the step where organization's asses the operations, services, and activities within their EMS fenceline and identify how each positively and negatively affects the environment. The result is most commonly a list of environmental aspects (how you interact with the environment) and impacts (actual impact on the environment) that helps an organization visualize their "environmental footprint" and focus in on the most significant impacts.

Lowell utilized a systematic approach to identifying their significant aspects and impacts, which included shared responsibility among each member of the ISO Team. The city took the following steps in the aspect identification process:

1. Each division's ISO Team Member was tasked to assign personnel to identify all activities that occurred under the division's direction. The teams utilized a process flow diagram approach to identify aspects and impacts of individual activities and operations.

2. The ISO Team, as a group, consolidated the individual division inputs into a single list of environmental aspects and impacts to determine which aspects were significant. To accomplish this step, Lowell scored each aspect against the following significance criteria:
   - Worker health and safety
   - Public health and safety
   - Severity of environment
   - Probability of occurrence
   - Regulatory/Legal concerns
   - Public image

   The ISO Team utilized a 0-4 scoring system with the following general classification system (0 = not applicable, 1 = low, 2 = moderate, 3 = high, and 4 = very high).

3. Based upon the initial analysis in 1998, Lowell determined that their major environmental impacts occurred in the following key areas:
   - Landfill/waste management;
   - Chemical management;
   - Odors;
   - Energy usage; and,
   - Industrial effluent

EMS OBJECTIVES, TARGETS, AND PROGRAMS

Based upon the identification of significant environmental aspects, Lowell established an EMS Master Index that lists objectives, targets, programs, procedures, monitoring and measurement techniques, and responsibility for each significant aspect. Each Master List builds upon the previous year's targets and results, with the most recent as follows:

Objective: Reduce Impact on Wastestream

Target(s)	Program(s)
1. Increase waste recycled by 5% by 12/31/05 2. Maintain program aimed at increasing public awareness in 2005 3. Eliminate sludge disposal to landfill	▪ Recycling programs. ▪ Catch Basin P2 ID Program; Utility & Citizen Used Oil Recycling Program. ▪ 10-year sludge utilization contract.

Objective: Energy Conservation

Target(s)	Program(s)
1. Continue to reduce Kw usage by 12/31/05	▪ Energy Incentive Program is all-encompassing at the Lowell Utility.

Objective: Improve Chemical Management

Target(s)	Program(s)
1. Achieve zero spills in 2005. 2. Continue to quantify state regulated waste disposed by end of 2005.	▪ Maintenance Division Program. ▪ Bulk Chemical Deliveries.

Objective: Odor Reduction

Target(s)	Program(s)
1. Not to exceed previous year's odor complaints	▪ Odor complaint logs. ▪ Odor reduction procedures.

Objective: Industrial Effluent

Target(s)	Program(s)
2. Establish inter-departmental new business awareness program	▪ Currently on hold.

BENEFITS OF ADOPTING AN EMS

Lowell has experienced a number of direct benefits from EMS implementation through increased focus upon their significant environmental and community impacts. In 2000, the Lowell Regional Wastewater Utility became the first municipal facility in the U.S. to certify all of its divisions to the ISO 14001 Standard. In accomplishing this tremendous feat and positioning Lowell as a municipal leader, the Utility achieved several "low hanging fruit" benefits that are common to EMS implementation. In the first few years, Lowell was able to completely offset the costs of EMS implementation through the identification of several cost saving measures, including:

- $11,228 saved in the first three years by recycling waste paper and cardboard, co-mingled wastes, batteries, metals, fluorescent lights, and used motor oil.
- $46,335 saved per year by replacing nine large energy inefficient pumps.
- $126,450 in rebates from Mass Electric for further energy reducing projects.

Lowell has maintained their high level of commitment to continual improvements, as the EMS has matured to become a routine part of everyone's daily activities and performance. In 2004, the utility realized the following performance results:

Significant Impact	2004 Results
Landfill Waste Management	Total lbs recycled 2001 = 59,077
	Total lbs recycled 2002 = 76,400
	Total lbs recycled 2003 = 37,850
	Total lbs recycled 2004 = 46,893
	Total gallons utility used oil in 2004 = 110
	Total gallons citizen used oil in 2004 = 140
	Total linear feet fluorescent bulbs in 2004 = 1,520
Energy Usage	Kw usage 2001 = 7,128,800
	Kw usage 2002 = 7,109,200
	Kw usage 2003 = 6,770,400
	Kw usage 2004 = 7,282,800
Chemical Management and Use	No reportable chemical spills in 2004
Odor	Odor complaints in 2001 = 17
	Odor complaints in 2002 = 18
	Odor complaints in 2003 = 24
	Odor complaints in 2004 = 12

The utility has also experienced a number of qualitative, but equally important in their organization, benefits such as establishing a working relationship with the state regulatory agency and capturing internal knowledge and experience for future use.

IMPLEMENTATION STRATEGY AND TIME FRAME As a participant in the 1st EMS Initiative for Local Governments, Lowell followed a structured approach to EMS implementation. The basic approach was broken down into 4 distinct faces, with each phase requiring completion of detailed tasks and documentation, over a 24 month period. The City started implementation in August 1997 and completed their initial internal audit and management review in July 1999. Lowell relied upon the external assistance of Gabe Crognale, President of MCG & Associates, to assist with EMS implementation.

PHASE 1

August 1997 – January 1998
- Establishing the program infrastructure within the organization
  - EMS fenceline and Plan
  - Gap analysis
  - Roles and responsibilities
  - EMS "kickoff" activities
  - Environmental Policy

PHASE 2

February 1998 – June 1998
- Significant Aspect analysis and determination
- Setting objectives and targets
- Evaluating legal requirements

July 1998 – January 1999
- Developing Environmental Management Programs to achieve objectives and targets
- Roles, responsibilities, and authorities
- Operational controls

PHASE 3

February 1999 – July 1999
- Monitoring and measurement
- Internal EMS Audit
- Handling non-conformances
- Management Review

PHASE 4

The utility conducts an internal EMS audit, conducted by the seven Core Team members, on an annual basis. Each audit covers the entire EMS fenceline and generally requires two employees and one external consultant over a one-two day time period. Recently, the utility has realized that they will need to be creative in recruiting new volunteers and building a larger auditing pool, as it is always healthy to have fresh eyes to keep a System continuously moving forward. This will also reduce the burden on Core Team members. One option also under consideration is to partner with other EMS practitioners in the local area for cross auditing.

OUTREACH Lowell has utilized the following main strategies to promote their environmental efforts and meet the ISO 14001 Standard:

1) *Published Articles*: There have been several articles published highlighting Lowell's EMS accomplishments and ISO 14001 certification.

2) *Environmental Commitment/Policy Cards:* Lowell produced wallet-sized, laminated cards which include the City's ISO 14001 logo on one side and a copy of Lowell's environmental commitment and EMS C.I.R.C.L.E. on the reverse.

3) *City Website:* Lowell is in the process of updating the City's website to include detailed information about the Utility's EMS and associated activities and performance.

RESOURCES REQUIRED TO IMPLEMENT/MAINTAIN THE EMS

Internal Labor -- One complete EMS cycle (24 months) required 1,424 total person hours at a total cost of approximately $27,100 in direct labor resources and $10,500 in consultant costs. This number represents the direct labor hours employees performed in addition to their regular duties

ISO Registrations and Audits – The Lowell Wastewater Utility spent approximately $5,000 on the initial ISO 14001 third-party certification audit. Lowell hired TUV to conduct the certification audit and has continued this relationship currently. TUV conducts yearly surveillance audits and three-year re-certification audits. The cost for surveillance audits is approximately $2,300. In addition, the City Manager has offered a cash incentive to employees to maintain the certification.

Other Material Costs – The Lowell Wastewater Utility spent approximately $4,800 in other travel and material costs during the initial EMS implementation. Travel costs included participation in training workshops as part of the national 1st EMS Initiative for Public Entities program.

3RD PARTY VERIFICATION In 2000, the Lowell Wastewater Utility became the first public entity in the U.S. to certify all of its divisions to the ISO 14001 Standard. The decision was made by the entire team to seek certification, as they all felt that after putting so much effort into the EMS that they should seek external verification and credit. The city has maintained certification since

2000, instituting an incentive program whereby employees are given financial rewards from the City Manager for successful third-party audits and maintaining certification. Lowell has utilized the auditing services of TUV since the initial audit in 2000, feeling that it has been valuable to the organization, and the health of Lowell's EMS specifically, to maintain this long-term relationship. Prior to the initial third party audit, the utility found it very helpful to conduct an EMS awareness refreshment training for all employees to instill confidence and preparedness internally.

BARRIERS/LESSONS LEARNED/KEYS TO SUCCESS

The Lowell Regional Wastewater Utility's EMS implementation was very much a pioneering effort among public entities. Having started initial implementation in August 1997, the ISO 14001 Standard was less than a year old, with most organizations and technical assistance providers simply working through the interpretation with only limited practical experiences to learn from and exchange.

Top 3 Keys to Success

1. Hard working and dedicated staff. If it wasn't for the committed staff and their high skill level and understanding of the EMS concept, implementing it and making it happen, Lowell would not be where they are today. It was important to the success of the program that everyone was actively involved, included, and participating. The Implementation Team was enthusiastic at weekly meetings and most importantly inquisitive. This resulted in quality exchanges, suggestions, and potential improvement opportunities. A good approach is to always mention EMS, even if only briefly, at all organizational meetings.

2. Supportive and committed upper management and city officials. Once support was obtained from the City Manager, the City Council and other elected officials it made it possible for the Department Head and the staff at the Wastewater Utility to move ahead with EMS implementation and associated projects and programs.

3. Another key to success was our decision to hire a consultant (Gabe Crognale, President of MCG & Associates) to assist with document control and the development of the EMS manual. These two areas were a weakness for the Lowell team and the consultant was able to fill this gap and help prepare the Utility for ISO 14001 certification.

Top 3 Barriers

1. Time and monetary resources. There is a tremendous amount of time involved in training and implementation. Educating employees about the ISO 14001

concept can be time consuming as well. Resources were also spent on consultants and ISO 14001 certification. In-kind contributions by members of the community were also significant.

2. Turnover in staff – the EMS Core Team suffered a loss in key staff involved in the documentation process, which ultimately cost a significant amount of time developing the EMS.

3. Show of support and buy-in from the community – there was some support from the City Council and the local media channels but support was lacking from the general community. Councilor support was demonstrated by funding the ISO trips and presentations. Local media provided positive stories about the project. However, Lowell did not see a strong excitement or interest level in the community concerning the EMS efforts and related programs.

Top 3 Lessons Learned

1. Bring on a consultant early on – it would have been helpful to have a consultant on board during the early stages of implementation to assist with the training of the Core Members and members of the facility. Training and education of the ISO 14001 standard took quite a bit of time. This time spent could have been minimized had Lowell hired a consultant to aggressively train all the members of the facility early in implementation. Consequently, Lowell hired a consultant a year and half into the project to assist with documentation and found the outside assistance very useful.

2. If Lowell were to do it over again, the City would have included an additional facility within its fenceline. Currently, the city is examining the possibility of developing an EMS for another City Department. The two-year EMS initiative was a long and involved process, including another facility in the training and education phase would have eliminated duplicating our efforts down the road.

3. Lowell had difficulty with some specific elements of EMS implementation - specifically, the development of metrics. The whole metrics discussion threw the team off track and was very difficult to put together. Lowell lacked documentation regarding the quantification of municipal production numbers, which hindered their ability to develop a baseline analysis of past performance. This practice is still relatively new in the municipal sector; development of the EMS helps facilitate this process.

NEXT STEPS   The Lowell Regional Wastewater Utility will continue their EMS excellence, maintaining third-party ISO 14001 certification for the foreseeable future. For now, the organization has decided that it would be too resource intensive at the present time, due to two major construction projects and a limited workforce, to expand the EMS fenceline. The utility has considered applying for the

U.S. EPA Performance Track program, as means to gain added recognition and internal incentive.

In the coming months, the City will focus more efforts upon external outreach, including a complete overhaul of the utility's website to focus upon EMS and other accomplishments. In addition, the City would like to add information related to the overall workings of a wastewater utility to further build awareness within the local community. The utility is also considering a public newsletter highlighting initiatives and performance.

ADDITIONAL INFORMATION   For additional information on Lowell's EMS experience and progress, please contact:

Mark Young, *Executive Director*
Lowell Regional Wastewater Utility
451 First Street Boulevard, Route 110
Lowell, MA 01850
(978) 970-4248
myoung@ci.lowell.ma.us

ADDITIONAL EMS INFORMATION AND RESOURCES

The amount of EMS guidance material available has grown exponentially over the last few years. A key source of EMS information specifically focused on public entities, such as drinking water and wastewater facilities, is provided by the National Public Entity EMS Resource Center (PEER Center). The PEER Center (www.peercenter.net) is a central clearinghouse of key resources such as service providers, sample documentation, state EMS programs, mentors, training materials, and case studies. The PEER Center is made possible through a cooperative agreement with the U.S. EPA EMS Programs (www.epa.gov/ems).

There are also several alternative EMS implementation guidance manuals available:

Environmental Management System Wastewater Handbook
The U.S. Environmental Protection Agency, the Global Environment & Technology Foundation (GETF), and a Wastewater Steering Committee comprised of wastewater facility managers with expertise and "hands on" experience in developing and maintaining EMSs have completed a joint effort to produce a user-friendly, practical EMS handbook (guidebook) directly focused on the EMS implementation by public wastewater utilities. The Handbook provides practical, step-by-step guidance on EMS implementation.
http://www.peercenter.net/sector/wastewater/index.cfm?FrontID=3903

Continual Improvement in Utility Management: A Framework for Integration
This Guide responds to a defined need within utility management by providing a roadmap showing how a collective group of management initiatives interrelate and how a utility can best approach integrating them in the context of a continual improvement management system framework. This Guide was funded through a cooperative agreement with the U.S. Environmental Protection Agency (EPA), and sponsored by the Association of Metropolitan Sewerage Agencies (AMSA) and the Water Environment Federation (WEF).
http://www.peercenter.net/ewebeditpro/items/O73F3799.pdf

Third EMS Initiative for Public Entities (2003-2004) – Final Report
This Final Report details the experiences of nine public organizations, including two wastewater treatment facilities, which participated in a U.S. EPA supported two-year EMS initiative. The report describes the implementation strategy, benefits, resources, and lessons learned, including individual organization profiles.
http://www.peercenter.net/ewebeditpro/items/O73F6926.pdf

An Environmental Management System Troubleshooters' Guide for Local Governments
The Environmental Management System (EMS) Troubleshooters' Guide for Local Governments has been compiled from experiences and lessons learned through

various EMS Initiatives for Government Entities. The practical data and case study material has been extracted from over 23 municipal, state, and local organizations which implemented EMSs as participants in these initiatives. The document is structured to systematically lead a facility, by addressing the needs and issues that a facility might encounter, throughout the four phases of EMS implementation. http://www.peercenter.net/troubleshooters.cfm

Environmental Management Systems: An Implementation Guide for Small and Medium Sized Organizations
In December 2000, the U.S. EPA, in cooperation with NSF International, completed this revised version of the original guide intended to offer a plain English, common sense guide to organizations interested in implementing an EMS, using the basic Plan-Do-Check-Act model. http://www.epa.gov/OW-OWM.html/iso14001/wm046200.htm

PEER LOCAL RESOURCE CENTERS
As part of the PEER Center, eleven Local Resource Centers (LRCs), located throughout the country, have been designated to further advance the goal of public sector EMS implementation. The LRCs, integrated into existing institutions, have been established for the purpose of providing local communities with technical expertise, field tested tools, information sharing, and support for EMS implementation. GETF will provide assistance to these organizations by helping develop business plans, providing relevant EMS materials to facilitate each organization's existing EMS assistance activities, train-the-trainer work sessions on ways to address the needs of public agencies, and other marketing services. These Centers will promote local EMS competence and encourage government-to-government sharing and mentoring that will contribute to significant savings in both time and cost for public sector organizations that want to pursue EMS implementation.

The LRCs were selected in two phases upon the completion of a competitive application and interview processes. The criteria utilized in the selection of the LRC's focused on business experience, EMS expertise, capacity, and organizational commitment, especially top management support. Based on these criteria, the following LRCs were selected:

Georgia Tech Economic Development Institute
Economic Development Building - Technology Square
760 Spring Street NW
Atlanta, GA 30332-0640
Contact: Deann Desai
Phone: (770) 605-4474
deann.desai@edi.gatech.edu
www.edi.gatech.edu/environment

Kansas State University
Pollution Prevention Institute

13480 S. Arapaho Drive
Olathe, KS 66062-1553
Contact: Steve Travis
Phone: (913) 764-6300, ext. 101
steve.travis@jocogov.org
www.sbeap.org

Purdue University
Indiana Center for Clean Manufacturing Technology and Safe Materials (CMTI)
2655 Yeager Road, Suite 103
West Lafayette, IN 47906
Phone: (765) 463-4749
www.ecn.purdue.edu/CMTI

Sustainable Earth Initiative
1904 Franklin Street, Suite 418
Oakland, CA 94612
Contact: Gary Lucks or Sue Sakaki
Phone: (510) 268-9210
gary@sustainableearthinitiative.org or sue@sustainableearthinitiative.org
www.sustainableearthinitiative.org

Texas Commission on Environmental Quality
12100 Park 35 Circle
Austin, TX 78753
Phone: (512) 239-1000
www.abouttexasems.org

University of Colorado
Colorado Environmental Business Alliance
420 UCB
Boulder, CO 80009–0420
Contact: Bud McGrath
Phone: (303)492-3307
bud.mcgrath@colorado.edu
http://www.ceba.org

University of Florida
The Center for Training, Research and Education for Environmental Occupations (TREEO)
3900 SW 63rd Blvd.
Gainesville, FL 32608
Phone: (352) 392-9570
Fax: (352) 392-6910
www.treeo.ufl.edu/ems

University of Massachusetts-Lowell
One University Avenue

Lowell, MA 01854
Phone: (978) 934-3900
www.uml.edu/ems

University of Missouri
Institute for Environmental Excellence
121 Fulton Hall, 1870 Miner Circle
Rolla, MO 65401
Contact: Dr. Harvest L. Collier or Amy Gillman
Phone: (573) 341-4390
hcollier@umr.edu or gillman@umr.edu
http://campus.umr.edu/iee/

Virginia Polytechnic Institute & State University
Center for Organizational and Technological Advancement (COTA)
110 Shenandoah Avenue
Roanoke, VA 24016
Phone: 540-985-5900
Fax: 540-853-8290
www.cota.vt.edu/vtems/

The Zero Waste Alliance
One World Trade Center
121 SW Salmon Street, Suite 210
Portland, OR 97204
Phone: (503) 279-9383
Fax: (503) 279-9381
www.zerowaste.org

www.peercenter.net

www.getf.org

www.epa.gov/ems

Contacts:

Jim Horne, National Program Manager
U.S. Environmental Protection Agency
1200 Pennsylvania Ave. NW
Washington, DC 20460
(202) 564-0571
horne.james@epa.gov

Faith Leavitt, Principal
Global Environment & Technology Foundation
14620 Fair Havens Road
Fort Myers, FL 33908
(239) 281-0052
fleavitt@earthvision.net

Nick Martin, Program Manager
Global Environment & Technology Foundation
2900 South Quincy Street, Suite 410
Arlington, VA 22206
(703) 379-2713
nmartin@getf.org

Achieving Environmental Excellence:
An Environmental Management Systems (EMS) Handbook for Wastewater Utilities

August 2004

Environmental Management Systems (EMS) Handbook for Wastewater Utilities

Table of Contents

EMS Handbook for Wastewater Organizations

Foreword

Dear Colleagues:

Water and wastewater utility managers are facing unprecedented challenges today as they address a wide array of issues ranging from increased public expectations for service levels, improved environmental performance and compliance, sustainable infrastructure expectations/needs, changing work force demographics, and more stringent regulatory standards. To help them address these challenges on an ongoing basis, a number of utilities are developing environmental management systems (EMS) for their operations.

Environmental management systems, first used in the private sector, provide organizations of all types with a structured framework for 1) assessing the organization's environmental impacts, 2) establishing policies along with measurable, goals, objectives, and programs for reducing these impacts, 3) checking and taking corrective action to ensure the EMS is meeting its goals, and 4) periodically having top management review the system to ensure continual improvement. An EMS is not a substitute for meeting regulatory requirements, but can enable an organization to both perform at levels beyond the minimum levels established for compliance and address environmental impacts, such as noise and odor, that may not be regulated. Finally, an EMS provides a way for an organization to continually manage and integrate its environmental obligations for all its programs and projects.

Development of this Wastewater EMS Handbook was funded through a cooperative agreement between the Office of Wastewater Management (OWM) at the U.S. Environmental Protection Agency (EPA) and the Global Environment and Technology Foundation (GETF). In order to reflect the real life experiences of wastewater organizations that have implemented

EMSs, EPA and GETF asked a small group of utilities and other professionals to serve on a Steering Committee for this project.

Throughout the Handbook, you will see numerous examples from our organizations that we hope will make it easier for you to develop your own EMS. We are also providing sample documents from all phases of the EMS process, including information on the time and cost of developing an EMS.

Based on our own experiences as well as those of many other public agencies, it is clear that EMSs work. They can and do provide a wide array of benefits to organizations. Our agencies have seen reduced costs, improved environmental performance, significantly enhanced internal communication, and better relations with our communities and regulators. Examples of these benefits and advice based on our experiences are included throughout the Handbook. Successfully implementing an EMS requires both a sustained commitment of time and resources and sustained top management support. However, we believe the benefits of the system far outweigh the costs.

EMSs also provide an excellent framework for integrating other important utility management programs like asset management, CMOM, the Balanced Scorecard, QualServe, and others. Many of us have used our EMSs in conjunction with these other programs. In conclusion, we appreciate the opportunity to help produce this Handbook and share our experiences with our colleagues. It fills an important need for our industry and will hopefully encourage an increasing number of utilities to develop their own EMSs and realize the benefits we have witnessed.
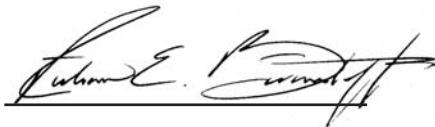
EMS Wastewater Steering Committee

Donna J. Adams
Environmental Health & Safety
Coordinator
Wastewater Division
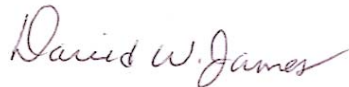Department of Public Works
City of Eugene, Oregon

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President, The Barrett Group
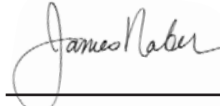Fort Mill, South Carolina

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Assistant Superintendent
Wastewater Collection Department
Commissioners of Public Works
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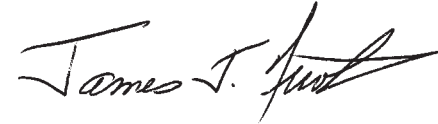
Beth Eckert
EMS Coordinator
City of Gastonia, North Carolina
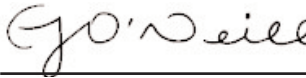
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Chris Toth, P.E.
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Wastewater Collection Division
City of San Diego, California

Acknowledgements

Where Did the Idea for an
EMS Wastewater Handbook Begin?

On September 23, 2003, the U.S. Environmental Protection Agency and the Global Environment & Technology Foundation (GETF) brought together an informal Environmental Management Systems (EMS) Wastewater Steering Committee comprised of wastewater facility managers with expertise and "hands on" experience in developing and maintaining EMSs for wastewater operations. Five members of this Steering Committee manage ISO 14001 registered EMSs within their respective organizations.

Each had the same thought after reflecting on their individual EMS implementation experiences: "There's so much we wish we had known before we began our EMS implementation. Let's capture that information in a handbook to help our colleagues in the wastewater industry demystify EMS implementation, provide step-by-step guidance, relate our lessons learned, and provide case study examples, implementation tools and materials that come from real wastewater facilities." Since the number of wastewater utilities implementing an EMS has grown considerably over the last several years, the committee felt that the time was right for a wastewater specific EMS handbook. And so, with the support and assistance of U.S. EPA's Office of Wastewater Management, this handbook was developed.

The Steering Committee agreed to assist GETF and U.S. EPA in developing a Wastewater EMS Handbook that specifically focuses on EMS implementation by public wastewater utilities. Each Steering Committee member provided their respective EMS document samples, implementation cost data, resource savings, case studies and EMS shortcuts, and agreed to be actively involved throughout the development process to ensure that the document would meet the needs of wastewater facility employees tasked with EMS implementation.

How is this Handbook Different from Others?

The EMS Handbook for Wastewater Organizations (referred to hereinafter as the "Wastewater EMS Handbook" or "Handbook") is written for wastewater facility operators and managers interested in or already in the process of implementing an EMS based on the ISO 14001 international standard (ANSI/ISO 14001 - 1996) and looking for guidance from wastewater colleagues who have implemented and maintained EMSs at their own wastewater treatment facilities. While the implementation guidance could very well serve other public or private sector facilities, all of the material comes from real life wastewater operations and is intended to benefit wastewater operators interested in enhancing their own understanding of EMS through the successful approaches and practical lessons of their wastewater industry peers.

Wastewater facilities have taken a leadership role in public sector EMS implementation since the adoption of the ISO 14001 EMS in 1996, so there is a wealth of data and information available. In fact, the guidance, information and materials collected here come from well over a dozen wastewater facilities. In addition, care has been taken to ensure representation from a range of facility sizes (daily average flows from 13 MGD to 180 MGD) across the United States in order to meet the diverse needs of the wastewater sector.

The Wastewater EMS Handbook builds on a number of excellent EMS implementation guidance documents that preceded it (see additional EMS information). These guides are well worth noting as information resources; they provide excellent contact

information, document samples, web links, and additional information resources across a wide variety of public sector operations. You will find that their implementation strategies are reasonably consistent with those in this Handbook. However, this Handbook focuses exclusively on information, data, tools and materials that come directly from the wastewater sector, and reflects the most up-to-date information possible about implementing EMSs in wastewater facilities. As you become involved in your own EMS implementation, we hope that you will consider sharing your best EMS practices to keep this Handbook current.

How this Handbook is Organized

This Wastewater EMS Handbook guides you through EMS implementation based on the Plan-Do-Check-Act model of the ISO 14001 Environmental Management System. The Handbook is designed primarily for EMS implementers, so the heart of it is a step-by-step guide that shows you how to build your EMS one element at a time. We have also added helpful sections to assist you in getting your organization ready to build its EMS, in understanding more about third-party registration of your EMS, and in accessing a number of appendices of additional tools, materials, and information resources.

The Wastewater EMS Handbook is organized into 5 sections:

1. What is an EMS and Why Do I Want One
2. Getting My Facility Ready to Implement an EMS
3. Step-by-Step Implementation Guide
4. Third-Party EMS Registration
5. Appendices

In each of the sections you'll find a list of EMS milestones to complete and a suggested timeframe for completing them. As you work to complete each of these EMS milestones, you'll be accomplishing an important step in building your EMS, using an implementation strategy that has been successful with dozens of utilities over the past seven years.

This implementation strategy is sequenced so that you can build your EMS one piece or element at a time. We strongly urge you to focus only on the activities and milestones described in the section you are working on. You do not have to do everything at once so there is no need to get ahead of yourself or worry about what is coming next. In each section and through each milestone, you will be guided and supported by helpful hints and up-to-date methods from your colleagues in wastewater facilities who have successfully implemented an EMS in organizations just like yours. These helpful hints include:

▶ An explanation of the intent of each EMS requirement.
▶ Step-by-Step guidance on how to complete each EMS requirement.
▶ An EMS dictionary that explains the EMS language and terms used in that section.
▶ Sample EMS procedures, policies, and other documents.
▶ Information about who might perform the tasks and the level of effort required from EMS leadership, front-line employees, and management.
▶ Lessons learned and keys to success from wastewater utilities who have implemented an EMS in facilities like yours.
▶ Case study data and information.
▶ How to involve contractors and temporary staff in your EMS activities.
▶ Pitfalls to avoid.

Icons will lead you to the hints, key concepts and tips. You'll find the following icon symbols in each section:

Coach's Corner emphasizes important concepts and key EMS requirements or responsibilities.

Keys to Success indicates keys to successful EMS implementation, as identified by the wastewater practitioners.

Notes highlight a point or concept important to EMS implementation.

Reminders are key points to keep in mind as you implement your EMS.

Stop Signs underscore the things to avoid during your EMS implementation.
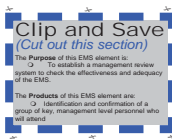
Grey Cutout Boxes are put at the end of each step-by-step implementation section to reference key information, especially for Environmental Management Representatives. Think of the cutouts as quick reference summary sheets for each EMS element.

Documentation Pyramids are placed in the sidebars of specific EMS step-by-step implementation sections to designate that a documented (written) procedure is a requirement for the element.

Here's an overview of the sections in this Wastewater EMS Handbook:

Section 1 - What is an EMS and Why Would a Wastewater Facility Want One?

This section explains what an environmental management system is, describes the basic elements of an EMS, and provides an overview of the typical costs, roles & responsibilities and the average timeframe for EMS implementation at wastewater facilities. It also includes benefits, keys to success, lessons learned, and the drivers wastewater facilities experience when implementing EMSs at their facilities. It lists

associations and regulators that support EMSs, plus resources and points of contact that wastewater practitioners have found useful. Finally, it discusses the opportunities and how well an EMS integrates with other management systems that wastewater facilities may have in place.

Section 2 - Getting My Facility Ready to Implement an EMS

This section identifies the organizational goals that lead wastewater facilities to implement an EMS. It provides an overview of the phased approach to an EMS, a sample EMS timeline, and a list of the tools (e.g., document samples, matrices, checklists, etc.) that wastewater facilities used during EMS implementation. It discusses the keys to success in choosing effective EMS leaders and managers and their roles and responsibilities to drive and communicate the EMS throughout the organization. Section 2 describes how to conduct a preliminary review of what an organization already has in place to meet EMS requirements (the Gap Analysis) and the keys to success, lessons learned and the potential barriers for wastewater organizations as they prepare to implement an EMS. Section 2 ends by discussing how wastewater organizations overcame the issues of new EMS language/jargon.

Section 3 - Step-by-Step Implementation Guide

This section describes the sequence of activities or "roadmap" for implementing the key elements of an EMS and explains why certain elements might need to be implemented in a certain order. The section also provides detailed guidance on how each element of an EMS could be designed and implemented and discusses each of the key elements of an EMS and suggests how to put them in place. Section 3 includes the experiences and relevant tools wastewater facilities used during their EMS step-by-step implementation.

Section 4 - Third-Party EMS Registration

This section discusses the process of third party registration under the ISO 14001 Standard and includes a discussion of what to look for in selecting a third party to conduct EMS registration. Section 4 includes the keys, lessons learned and things to avoid when considering a third party to review an EMS and provides the costs, typical timeline and third party registration points-of-contact from wastewater organizations that have chosen to third party register.

Section 5 - Conclusion

This section provides a brief review and point-of-contact information for wastewater facility personnel who have experience in implementing EMSs, and are willing to share their knowledge with other wastewater organizations.

Section 6 - Appendices

This section describes sources of EMS information and provides sample EMS policies, procedures, and other tools that organizations can tailor to fit its EMS needs. The sample procedures, checklists, tools, etc. are from EMS wastewater facilities that have implemented EMSs. In addition, Appendix D contains an EMS Glossary with the terms used throughout the Handbook.

Section 1: What is an EMS and Why Would a Wastewater Facility Want One?

What this Section Will Cover:

⇨   What is an Environmental Management System (EMS)?

⇨   The Drivers and Benefits of Implementing an EMS - Why Do I Want One?

⇨   Support for EMSs from Regulators and Associations

⇨   EMS Integration with Other Management Systems

⇨   FAQs

What is an Environmental Management System (EMS)?

An Environmental Management System (EMS) is a set of management processes and procedures that allows an organization to analyze, control and reduce the environmental impact of its activities, products and services, and operate with greater efficiency and control. An EMS is appropriate for all kinds of organizations of varying sizes in both the public and private sectors.

This Wastewater EMS Handbook uses the ISO 14001 Standard (1996) as the EMS model for implementation. The EMS is built on ISO 14001's Plan-Do-Check-Act (P-D-C-A) model and is designed to help you systematically identify, control and monitor your environmental issues.

An Environmental Management System includes:

■   Defining roles and responsibilities

■   Identifying and prioritizing environmental impacts

■   Setting measurable objectives and targets

■   Verifying and establishing operational controls

■   Monitoring and measuring activities and progress

■   Seeking continual improvement as part of a review cycle

You will probably find that an EMS does not involve a drastic change from the way you are conducting business now. In fact, most organizations find that they have many of the pieces of an EMS already in place. The EMS builds on what you are doing well now, and provides a structured approach to improve what you want to do better.

Key Section Terms

ISO 14001 – One of the Environmental Management Standards developed by the International Organization for Standardization in Geneva, Switzerland. It is the requirements document that specifies the 17 elements of an EMS.

Continual Improvement – One of the three main commitments of the EMS. After checking their EMS through monitoring and measuring, and find, fix, and prevent audits, organizations apply the lessons they have learned to improve their environmental management.

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

Environmental Management Representative (EMR) – The clearly-identified EMS team leader who has the responsibility and management authority for implementing the EMS from start to finish.

EMS Core Team – A cross-functional team made up of individuals within the organization that helps facilitate EMS implementation across the organization. They are the EMS experts and cheerleaders.

An EMS:

☞   Does not direct an organization to meet certain discharge or emission limits. It does describe the internal framework that should be in place (e.g., policies, procedures, training, communication, documentation) to have a proactive system to manage environmental issues.

☞   Does not tell an organization how or what to manage. That is up to the organization. An EMS defines the critical management elements and operational controls that must be in place and followed to control the impact an organization has on the environment.

☞   Is designed to be applicable to all types of organizations and facilities: large and small private companies and public organizations such as municipalities, federal facilities and wastewater treatment plants.

COACH'S CORNER

An effective EMS must be dynamic to allow your organization to adapt to a quickly changing environment. For this reason, you should keep your EMS flexible and simple. This also helps make your EMS understandable for the people who must implement it - your organization's managers and employees.

COACH'S CORNER

An EMS should integrate environmental management into your day-to-day operations as well as into your strategic organizational decisions by providing a systematic ("find, fix, and prevent") approach to managing your responsibilities. Also, because an EMS is a not a traditional top down management approach, the environment becomes the responsibility of *everyone* by providing *everyone* with a voice on the best way to manage their areas and impacts.

An EMS is made up of 17 elements that are common to most models. Here's a brief snapshot of what's needed under each one:

Environmental policy — Develop a statement of your organization's 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 your organization.

Environmental aspects — Identify environmental attributes of your products, activities and services. Determine those that could have significant impact on the environment.

Legal and other requirements — Identify and ensure access to relevant laws and regulations, as well as other requirements (trade association, local government initiatives, etc.) that your organization must meet and follow.

Objectives and targets — Establish environmental goals for your facility, consistent with your policy, environmental impacts, and the views of interested parties.

Environmental management program — Create plans of action necessary to achieve your objectives and targets.

Structure and responsibility — Establish roles and responsibilities for environmental management and provide appropriate resources.

Training, awareness and competence — Ensure that employees are trained and capable of carrying out their environmental responsibilities under the EMS.

Communication — Establish processes for internal and external communications on environmental management issues.

EMS documentation (EMS Manual) — Maintain information on your organization's EMS. Define, be consistent, and provide an overview of your EMS's key policies, procedures, and related documents.

Document control — Ensure effective management of procedures and other system documents.

Operational control — Identify, plan and manage your operations and services in line with your policy, priority environmental issues, and objectives and targets.

Emergency preparedness and response — Identify potential emergencies and develop procedures for preventing and responding to them.

Monitoring and measurement — Monitor your key activities and track performance.

Nonconformance and corrective and preventive action — Identify and correct problems and prevent their recurrence.

Records — Maintain and manage (access, retention, disposition) EMS records (training, audits, performance, etc.).

EMS audit — Periodically verify, internally and/or through a third-party, that your EMS is operating as intended.

Management review — Assess your organization's EMS with an eye toward continual improvement. [1]
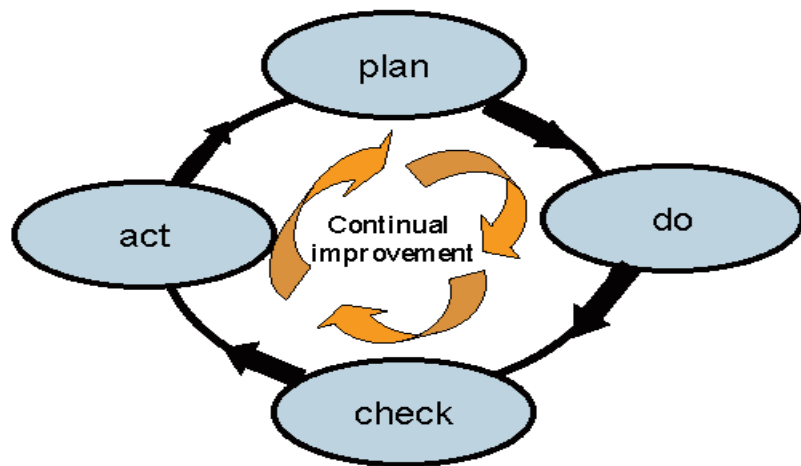
This P-D-C-A model will lead to continual improvement based upon:

Planning: identifying the environmental impacts ("footprint") of your organization's operations and services, tracking and following legal requirements, setting environmental goals, and establishing programs (i.e., action plans) to achieve your goals.

Implementing or "Do": defining and communicating EMS roles and responsibilities, developing operating procedures and written programs to manage significant environmental aspects, training contractors and staff, developing methods to manage documents and records, and establishing emergency response procedures to prevent and respond to environmental incidents.

The Benefits of Implementing an EMS: *What Wastewater Utilities are Saying*

Managing a Changing Workforce

A formal system of documentation will help sustain an EMS as staff turns over and will help diffuse knowledge about changes as they occur. The standard operating procedures (SOPs) provide 'present-tense' guides to employees; the records created to track various activities signify 'past-tense' activities and the evidence that certain activities have actually occurred.

Ellen Barrett
The Barrett Group

Systematically Managing Environmental Issues

Our planning has improved considerably. Prior to EMS establishment, no formal, consistent structure was available for planning. Also, our planning is much more focused, with drivers in place, and our associates (employees) have a better understanding of the reasons behind the planning initiatives. Additionally, knowledge of our company's impact on the environment has been heightened.

Rick Bickerstaff
Charleston, South Carolina
Commissioners of Public Works

In the City of San Diego, Metropolitan Wastewater Department's (MWWD) Wastewater Collection Division (WWCD), major improvements have been made in communication, clarification of organizational goals, and tracking of these goals. The WWCD currently has 343 budgeted full-time positions and an annual operating budget of $63 million. The actual planning and implementation of an EMS has resulted in section leaders within the WWCD communicating between sections in a more organized and frequent manner.

Chris Toth
City of San Diego
Wastewater Collection Division

Improving Employee Understanding of Environmental Issues

Throughout the wastewater organization, there is a better understanding of the purpose of the EMS, our legal requirements, environmental impacts, and each person's role within these areas. There is improved organization and tracking of requirements, training, and related paperwork. All personnel are more proactive with looking for and making suggestions of better ways to do certain tasks. In addition, staff now have a better understanding of what is expected of them and management has confidence that their expectations have been communicated to staff through the training process and documented procedures.

Beth Eckert
Gastonia, North Carolina
Public Works and Utilities Department

Checking and Corrective Action: monitoring and measuring key environmental parameters and your EMS objectives to assess environmental performance, conducting internal reviews of your EMS, and ensuring that specified practices are followed.

Management Review and Act: review by top management to ensure that your EMS is working as intended and is effective in meeting your environmental goals. Making critical course corrections, resource allocation, and strategic planning to ensure that your organization remains on the path to continual improvement. [2]

PHASE 1: Getting Ready

Activities in the Getting Ready Phase focus on adequately preparing your organization for the task of implementing an EMS. Before diving head first into implementation, it is critical that your team understands the EMS implementation strategy and that fundamental building blocks are in place to position your organization for successful implementation.

Activities for Phase 1 include:
- Select your EMS "fenceline" or implementation focus area(s).
- Confirm commitment and support throughout the organization, especially from top management.
- Designate an EMS leader and form EMS implementation teams.
- Conduct a preliminary review of your EMS components in place (i.e., a "gap" analysis).

Phase 1: Getting Ready

Select an EMS Fenceline	→	Confirm Top Management Commitment and Support	→	Conduct a Gap Analysis
		↕		
	→	Designate EMS Leader and EMS Implementation Teams	→	

[2] Adapted from Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, 2nd Edition, NSF International, January 2001.

The diagram shows a continual improvement cycle with the following phases:

Phase 5 Management Review (Act)

Phase 2 Environmental Policy

Phase 4 - Checking and Corrective Action
- Monitoring & Measurement
- Nonconformance & Corrective & Preventive Action
- EMS Audits

Continual Improvement

Phase 2 - Planning
- Environmental Aspects
- Legal & Other Requirements
- Objectives & Targets
- Environmental Management Programs

Phase 3 - Implementing
- Structure & Responsibility
- Training, Awareness, Competence
- Communication
- EMS Documentation (EMS Manual)
- Document and Records Control
- Operational Control
- Emergency Preparedness/Response

3

PHASE 2: Planning

Activities in the Planning Phase lay out the foundation for your EMS with the development of specific EMS elements. Your team will work to identify how your organization can affect the environment and then prioritize these issues to focus EMS efforts. Once you have identified and prioritized your environmental issues or aspects, you will determine in which areas (your choice!) you want to improve by setting objectives and targets. You will manage your objectives and targets with environmental management programs (action plans), that will define **who** on your staff will help in accomplishing your EMS goals, **what** tasks will be accomplished, **when** (timeframes) the tasks will be accomplished, and the **resources** required.

3 Adapted from Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, 2nd Edition, NSF International, January 2001.
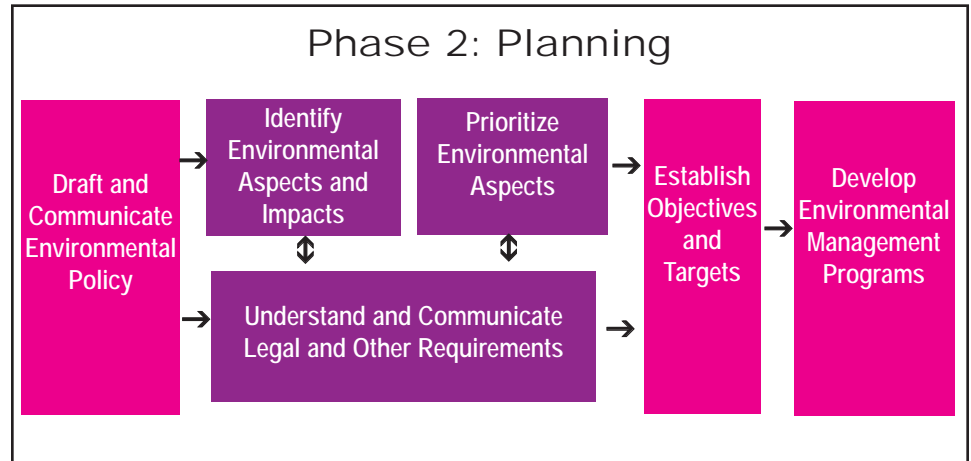
Activities for Phase 2:

- Draft and communicate your environmental policy.
- Create a procedure for understanding and communicating your legal and other requirements.
- Identify the environmental issues (both regulated and non-regulated) of your operations and services.
- Develop a method for prioritizing your environmental aspects.
- Set realistic objectives and targets based on your significant issues and environmental policy.
- Develop action plans (i.e., environmental management programs) that will help you go from the start to finish line in meeting your objectives and targets.

Phase 2: Planning

Draft and Communicate Environmental Policy → Identify Environmental Aspects and Impacts ⇕ Understand and Communicate Legal and Other Requirements → Prioritize Environmental Aspects → Establish Objectives and Targets → Develop Environmental Management Programs

PHASE 3: Implementing or "Do"

The Implementation Phase of an EMS has two major activities: 1) managing significant aspects that were defined in the Planning Phase; and 2) establishing performance indicators for each of your environmental targets. Begin by focusing specifically on how you can best manage and address the significant environmental issues within your organization. Manage these significant environmental issues by refining, and in some cases creating, standard operating procedures and work instructions. Phase 3 includes defining implementation team roles and responsibilities and establishing internal and external lines of communication. This is an opportunity to take a more focused look at the specific operations and services that you decided were most significant for your wastewater facility.

In Phase 3 you will also define how your organization will achieve better environmental performance in relation to your defined objectives and targets. To accomplish this, you will need to define a series of performance indicators to assess and promote improvement. Many of these indicators will be obvious (e.g., environmental regulations), whereas others, especially those involving your organization's objectives and targets, may be a little more challenging to define at first.

Activities for Phase 3:
- Clearly define roles and responsibilities, particularly in regard to 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 your entire operational fence-line.
- Establish ways to communicate effectively with external stakeholders about your EMS.
- Establish operational controls, including a review of existing standard operating procedures and other documentation (e.g., work instructions, manuals, etc.) for your 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 targets so that the targets can be measured and goals met or improved on.

Phase 3: Implementing

Organizational Accountability	Capabilities & Communications	Controls

Structure & Responsibility → Training, Awareness and Competence; Communication → EMS Documentation; Document & Records Control; Operational Control; Emergency Preparedness & Response

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PHASE 4: Checking and Corrective Action
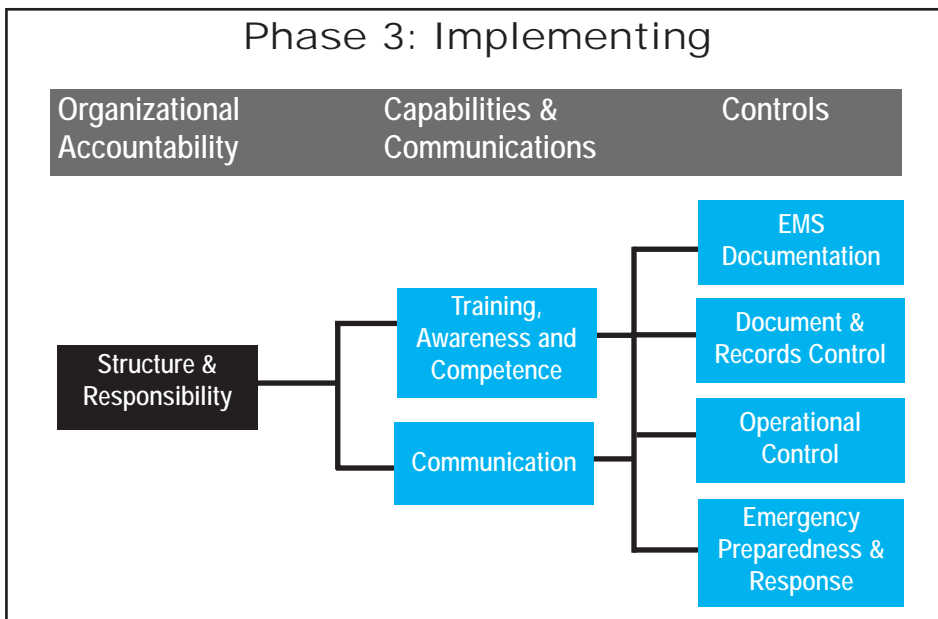
In Phase 4 you will define and document methods that your organization will use to verify that your EMS is effective and functioning as you intended. The check, an EMS audit or review, is a tool that you will use to periodically use to identify any flaws or weaknesses in your EMS. Remember, this is a "find, fix, and prevent" system, and this information can help you assess how well your EMS is functioning and put you on the road to continual improvement. As part of the audit process, your organization will take corrective actions on any "findings" (nonconformances— concerns or deviations from planned activities) to make sure that non-conformances are examined for their root cause, corrected, and prevented from reoccurring.

Activities for Phase 4:

- Monitor and measure key characteristics of your management system.
- Determine compliance status.
- Ensure that instruments used for monitoring and measuring are calibrated.
- Develop and implementing procedures for handling EMS non-conformances.
- Conduct internal EMS audits.
- Maintain EMS records.

Phase 4: Checking and Corrective Action

Ongoing Monitoring and Measuring; Check Calibration and Compliance	→	Nonconformance, Corrective and Preventive Action	→	Records

Internal EMS Audits →
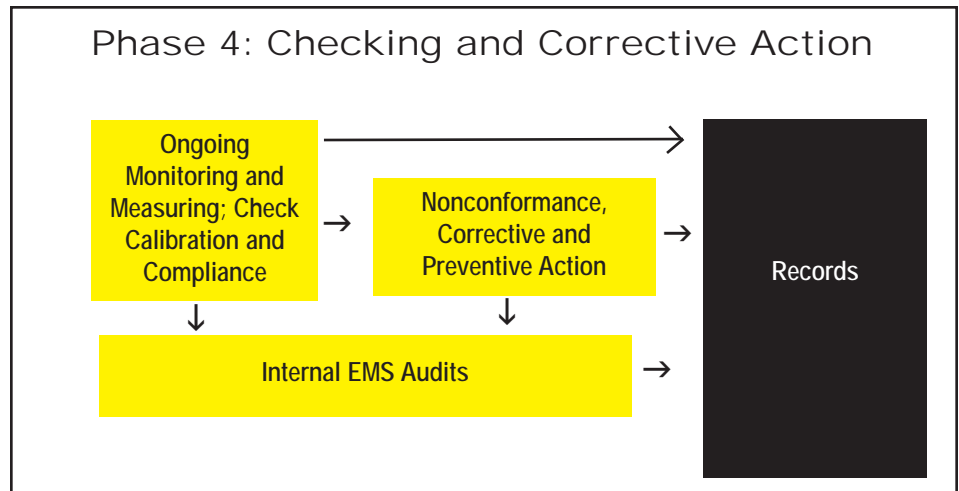
PHASE 5: Management Review (Act)

The Management Review is the final element in the EMS cycle. It's an opportunity for top management to review and fine-tune your EMS and make course corrections, if needed. Top management will determine whether the EMS is functioning as you intended, where additional resources may need to be allocated, if your environmental policy is appropriate or needs to be revised, and if your organization's objectives and targets are on track.

Activities for Phase 5:
- Judge the suitability, adequacy, and effectiveness of the EMS.
- Consider new organizational goals.
- Apply lessons learned for continual improvement.

NOTE

It's important to keep your managers updated frequently on your EMS and its progress. Don't wait until the Management Review to involve top management and to report on the performance and status of your objectives and targets and the overall progress of your EMS.
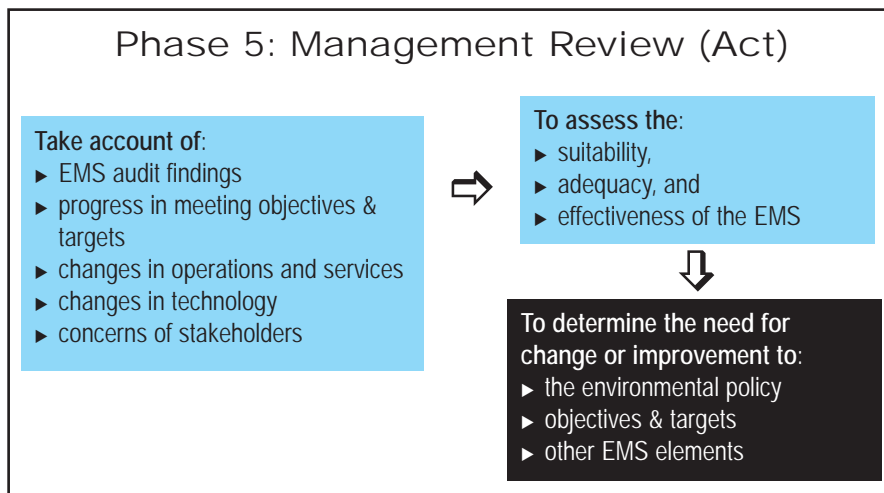

Phase 5: Management Review (Act)

Take account of:
- EMS audit findings
- progress in meeting objectives & targets
- changes in operations and services
- changes in technology
- concerns of stakeholders

To assess the:
- suitability,
- adequacy, and
- effectiveness of the EMS

To determine the need for change or improvement to:
- the environmental policy
- objectives & targets
- other EMS elements

Why Do I Want an EMS?

As public entities, wastewater utilities serve the public well-being, and public interest in environmental health and safety is high. Wastewater utilities have increasingly begun turning to Environmental Management Systems to improve their environmental performance and operational control and efficiency. These improvements usually mean avoided costs and dollars saved. In fact, over 50 wastewater utilities are in the process of implementing an EMS under the National Biosolids Partnerships program, with many more having implemented, or are in the process of implementing, an EMS through federal, state and local government sponsored programs.

What about your organization? Can an EMS bring you benefits? Here's a quick survey that may help you:

- Is your organization required to comply with environmental laws and regulations?

- Would you appreciate opportunities to improve how you manage your environmental responsibilities?

Why Implement an EMS?

Organizational Drivers from Wastewater Facilities

"Improved teamwork, communication, understanding, and awareness across divisional functions."
Buncombe County, North Carolina

"Improved relationships with the local community and regulators."
Charleston, South Carolina

"A better response to sewer overflows through enhanced operational controls."
Kent County, Delaware

"Ensured management involvement and clarified organizational goals."
Eugene, Oregon

"Increased efficiency in managing environmental obligations."
Gastonia, North Carolina

From the United States Environmental Protection Agency Position Statement on Environmental Management Systems (EMSs), signed on May 15, 2002 by EPA Administrator Whitman: "EPA will foster continual learning by supporting research and public dialogue on EMSs that help improve our understanding of circumstances where EMSs can advance the Nation's environmental policy goals. We will strive to collect better information on the application of EMSs, including how well EMSs meet environmental performance expectations; and the costs and benefits to organizations and the environment."

- Are you concerned that large portions of your workforce are retiring and taking undocumented operational knowledge with them?

- Would you like to improve your environmental performance?

- Would you like to identify and manage your risks effectively and efficiently?

- Are you concerned about your public image?

- Do you need better communication channels to capture good ideas from the frontline for improving your operations?

- Would you welcome the opportunity to reduce inefficiencies and save money?

- Would improved teamwork, communication and environmental understanding be useful in your daily operations?

- Would you like to improve competitiveness and reduce the risk of privatization?

If your answer was yes to any of these questions, then an EMS will benefit your organization. Wastewater facilities across the country have success stories about the improvement that resulted from implementing and maintaining an EMS.

Federal, State and Association Support for EMS

Regulatory agencies, facing increasingly limited financial and human resources, are recognizing that the promotion of EMS concepts is a way to further their goals of environmental protection. There are numerous state and federal programs that support the implementation of EMSs in the regulated community.

The U.S. Environmental Protection Agency's (U.S. EPA) support for the voluntary adoption of EMSs has been evident since the mid-1990s. The Office of Water (OW) has been the leader in promoting EMS adoption with public agencies. OW, working with the Global Environment and Technology Foundation (GETF), has sponsored over 30 public agencies as they have adopted EMSs since 1997. More recently, OW designated seven organizations around the country as EMS Local Resource Centers (i.e., PEER Centers) to meet the EMS needs of public agencies around the country through training, education, and other forms of technical assistance. Finally, a national clearinghouse of EMS information geared to the needs of public agencies has been established. Information on all of these efforts can be found at www.peercenter.net.

Federal support for EMSs is also demonstrated through U.S. EPA's Performance Track Program. Performance Track encourages and recognizes top environmental performance by private and public facilities across the United States. Performance Track facilities exceed compliance with regulatory requirements and achieve environmental improvement and excellence by utilizing an EMS as a fundamental mechanism. To encourage environmental achievement and continuous environmental improvement, U.S. EPA offers incentives to Performance Track members, including:

Recognition – Recognition of member accomplishments by the U.S. EPA Administrator and other top officials through national and regional press releases, meetings and other vehicles.

Networking – Promoting exchange of information and creating a "learning network" for members.

Lower Priority for Routine Inspections – Establishing Performance Track members as a lower inspection priority since a performance- and compliance-focused EMS, coupled with periodic auditing, should prevent non-compliance at Performance Track facilities.

Regulatory and Administrative Incentives – Regulatory and administrative actions that only apply to participating Performance Track facilities (e.g., flexible permits that will reduce permitting costs and uncertainty).

As of November 2003, there were more than 300 members in Performance Track from around the United States, including numerous municipalities and 15 federal facilities participating in the program. For more information about Performance Track, go to http://www.epa.gov/performancetrack.

State Support for EMSs

States are increasingly strong supporters of EMSs. For example, Virginia's Department of Environmental Quality's (DEQ) Environmental Excellence Program (VEEP) (http://www.deq.state.va.us/veep/) will grant regulatory incentives in exchange for "actions that are shown to provide greater environmental protection than are provided through current practices" (e.g., those that exist under the current regulatory requirements or program structure). Additional information on state EMS programs and regulatory incentives can be found on the Multi-State Working Group's Website (http://www.mswg.org). MSWG is an organization formed by several state representatives who have successfully formed an alliance with U.S. EPA to encourage implementation of EMSs. Also check the National Technical Assistance Providers (TAP) Directory (www.peercenter.net/taps) and your own states policies and incentives on EMSs.

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Increased Community Confidence and Willingness to Pay

"We are integrating and implementing environmental management systems based upon strategic planning and continual improvement. This has increased our customer's understanding, support, and willingness to invest more community money into an aged and obsolete infrastructure and has increased customer confidence that the Department can provide economical and high quality services."

Diane Taniguchi-Dennis, P.E.
Director of Public Works
City of Albany, Oregon

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Increased Investor Confidence

Association Support for EMSs

A number of associations that interact with wastewater organizations support EMSs, including the American Water Works Association (AWWA) - http://www.awwa.org, the Environmental Council of the States (ECOS) - http://www.sso.org/ecos, the International City/County Management Association (ICMA) - http://www1.icma.org, the National Association of Counties (NACO) - http://www.naco.org, and the Water Environment Federation (WEF) - http://www.wef.org, among others. Many of these organizations have funded specific EMS initiatives and research. For more information on the association above and their support of EMS, visit their Websites.

EMSs Are an Ideal Tool to Integrate Other Important Utility Management Programs

Wastewater utilities are facing a number of pressing management challenges and there are many different programs to help them improve in a variety of areas. EMSs do not in any way detract from these other management tools. Rather, an EMS is one of the best ways to integrate many other utility management programs.

In fact, effective asset management can be an essential part of a wastewater EMS. For example, effective asset management could be reflected in an organization's policy statement, and should be an important consideration as wastewater organizations determine their significant environmental aspects, objectives and targets, and develop environmental management programs to help achieve their objectives and targets.

Asset management is one of the most important challenges facing wastewater utilities. Improperly managed and maintained capital assets not only have major negative impacts on the environment, but can substantially increase the cost of providing basic wastewater services. For more information on managing wastewater assets, the Association of Metropolitan Sewerage Agencies (AMSA) developed a guidebook titled "Managing Public Infrastructure Assets."

Implementing an EMS can also prepare utilities to face new or expanded regulatory requirements. For example, many utilities are now being asked to implement Capacity, Management, Operations, and Maintenance (CMOM) programs to better manage their wastewater collection systems. Developing an EMS forces a utility to consider many of the more specific requirements of an effective CMOM program. The Charleston, South Carolina Commissioners of Public Works (CPW) found that having an EMS in place made it much easier to implement an effective CMOM program because many of the steps for doing so had already been taken as part of developing their EMS.

Finally, an increasing number of utilities are realizing the need to develop a comprehensive management system that will help address many different outcomes including, but not limited to, environmental outcomes. To address this need, EPA, the Water Environment Federation (WEF), and AMSA cooperated on an important guide to help utilities understand how to integrate various management initiatives under the umbrella of a comprehensive management system. This guide, titled "Continual Improvement in Utility Management: A Framework for Integration," can be found at www.epa.gov/ems, www.peercenter.net, www.amsa-cleanwater.org, and www.wef.orgcan.

This Handbook contains several useful case studies from existing utilities, most of which used their EMS as the starting point for developing a more comprehensive system.

For those agencies that wish to implement an EMS that initially focuses only on biosolids, the National Biosolids Partnership (NBP), has developed an EMS program that is similar in structure to ISO 14001. The NBP program requires a more proactive public participation program, along with regular public reporting. Also, participating agencies must undergo an independent 3rd party audit before receiving a certificate from the NBP. This auditing program is similar to the 3rd party auditing program under ISO described later in this document. More information on the NBP program can be found at www.biosolids.org.

Frequently Asked Questions about Environmental Management Systems

Q. We already have a compliance program–why do we need an EMS?
A. An EMS can help you to comply with regulations more consistently and effectively. It also can help you identify and capitalize on environmental opportunities that go beyond compliance.

Q. How big does an organization need to be to successfully implement an EMS?
A. EMSs have been implemented by organizations ranging in size from a couple of dozen employees to many thousands of employees. The elements of an EMS (as described in this Handbook) are flexible by design to accommodate a wide range of organizational types and sizes.

Q. Will an EMS help us to prevent pollution and to minimize wastes?
A. A commitment to preventing pollution is a cornerstone of an effective EMS and should be reflected in an organization's policy, objectives and other EMS elements. Examples throughout this Handbook show how organizations have used an EMS to prevent pollution.

Q. How will an EMS affect my existing compliance obligations?
A. An EMS will not result in more or less stringent legal compliance obligations. But an EMS should improve your efforts to comply with legal obligations, and, in some cases, may lead to more flexible compliance requirements.

Q. Do we need to be in 100% compliance in order to have an EMS?
A. No. The concept of continual improvement assumes that no organization is perfect. While an EMS should help your organization to improve compliance and other measures of performance, this does not mean that problems will never occur. However, an effective EMS should help you "find, fix, and prevent" these problems and prevent them from recurring.

Q. What is ISO 14001?
A. ISO 14001 is an internationally recognized standard for the environment. It provides a systems approach patterned after a model of plan, do, check and act. ISO 14001 is one of a series of Environmental Standards developed by the

International Organization for Standardization. The ISO 14001 standard includes all of the elements needed to develop an environmental management system in an organization.

Q. What are the benefits of an EMS?
A. An EMS provides tools to help manage your organization's environmental impacts efficiently and effectively and to improve the impact of an organization's environmental "footprint." Public organizations who have implemented an EMS have realized the following benefits:

- Cost savings
- Reduced risk to the environment and employee
- Increased operational efficiency
- Positive external relations and public image
- Improved communication
- Improved public relations

Q. What are the hurdles to implementing an EMS?
A. It is important to realize that developing and implementing an EMS requires an investment of time and effort. Along the way there can be hurdles such as: difficulty managing organizational change, lack of top management visibility and involvement, lack of public awareness and understanding, maintaining momentum (especially at the frontline), and political uncertainties.

Q. Is EMS compatible with other management system approaches?
A. Yes. Whether you have a quality management system, asset management system, or participate in the National Biosolids Partnership, an EMS is compatible and can be integrated with any systems type approach. For example, procedural methods for handling operational and environmental records and providing training are universal and should integrate well. Furthermore, the process of identifying environmental and operational priorities, setting targets and checking progress on those targets will be very similar in any management systems approach.

Section 2: Getting My Facility Ready to Implement an EMS

In previous sections, we've reviewed the benefits you can expect from your EMS, briefly described the 17 key elements in the EMS, and graphed and explained the five phases of EMS implementation. You're probably eager to plunge directly into building your EMS, but before you do, it's critical that you prepare your organization for the task—what's been called the warm-up and soak-in period. The Getting Ready Phase should take your organization about three months, and its importance cannot be overstated.
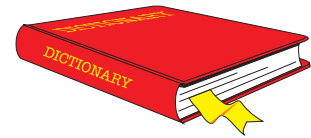
What this Section Will Cover:

⇨ Choosing Your EMS "Fenceline"

⇨ Understanding Your Organizational Goals

⇨ Top Management Commitment, Involvement, and Visibility

⇨ EMS Program Leadership

⇨ Securing and Maintaining Employee Buy-in

⇨ Conducting an EMS Gap Analysis or Preliminary Review

⇨ Managing Change

⇨ Understanding the Implementation Strategy

⇨ EMS Information Sources and Resources

⇨ FAQs

Choosing Your EMS Fenceline

When you decide to implement an EMS, one of the first decisions will be where it will apply. Where you apply your EMS is commonly referred to as the EMS "fenceline." An EMS can be applied to any operation or activity, to an entire division or within one department.

Experience from public organizations has shown that starting small is the way to go. Select one operation or department as a pilot, gaining confidence and experience as you build your EMS. Consider starting with a smaller or more manageable operation, then expanding and transferring the lessons learned and knowledge to other departments. Personnel in the original fencelines can then be EMS mentors, trainers or champions as new areas of the organization are added. Five out of six of our wastewater practitioners used an incremental approach for EMS implementation, choosing a manageable pilot operation or division first. These EMSs were then expanded out to include other departments and/or divisions.

Key Section Terms

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

Environmental Management Representative (EMR) – The clearly-identified EMS team leader who has the responsibility and management authority for implementing the EMS from start to finish.

EMS Core Team – A cross-functional team made up of individuals within the organization that help to facilitate EMS implementation across the organization. These are the EMS experts and cheerleaders.

EMS Implementation Team – Individuals within the organization who are closest to the actual workflow and who assist the Core Team and the EMR in better understanding operational activities. Implementation Teams are generally very involved in designing operational controls, testing emergency preparedness and response plans, and identifying the environmental aspects of their daily activities.

EMS Fenceline – Operational area or areas within an organization where the EMS is implemented.

Gap Analysis – Preliminary assessment of an organization's environmental programs and management practices to see where they match up with EMS requirements.

Top Management – Person or group with executive responsibility for the organization and the EMS.

Questions to Consider When Selecting Your Fenceline:

1) Which of our operations has the most environmental hot-spots? Which operations give us more headaches?

2) Where do we use the most natural resources? Energy? Hazardous materials?

3) Which operations offer the most transferability and replication to other wastewater operations?

4) Which of our operations has the most receptive management? Line Supervisors? Employees?

5) Which of our operations are NOT in the middle of a capitol improvement project or being restructured or reorganized?

Here are some examples of EMS fencelines in wastewater organizations across the United States:

Wastewater Organization	Fenceline
Buncombe County, North Carolina Metropolitan Sewer District	Wastewater Treatment Plant; Operations Department; Electrical Maintenance; Structural Maintenance; Mechanical Maintenance; and WWTP Administration
Charleston, South Carolina Commissioners of Public Works	Water Distribution Department Wastewater Collection Department
Eugene, Oregon Public Works	All Wastewater Operations
Gastonia, North Carolina Public Works	Wastewater Treatment Division: 2 WWTPs; a laboratory; pretreatment; biosolids; and a resource recovery farm
Kent County, Delaware Public Works	Wastewater Collections, Wastewater Treatment, and Biosolids Treatment
San Diego, California Metropolitan Sewer District	Operations & Maintenance Division (pilot); Wastewater Collection Division; Water Operations Divisions (3 of the 6 Divisions within San Diego's MWWD)

Once top management has confirmed the fenceline selection, it's time to pay a visit to the managers and supervisors in the fenceline divisions. You'll certainly want to include all types of employees (i.e., union stewards, contractors, temporary staff) in your discussions right from the start. You'll want to think about how best to prepare them all for the EMS implementation experience. It's a fact that the time you invest now in promoting awareness, understanding, receiving buy-in, especially among managers and supervisors, will be time saved later in the process.

One point repeated by wastewater facilities that have implemented EMSs is to spend extra time with managers and supervisors. One-on-one conversations can identify their needs, concerns, and problem areas. The more middle managers involved in the initial stages of the EMS, the more support and buy-in you will get. An EMS involves all employees in the fenceline at appropriate points in the implementation process, including support services like H.R.—so get out there and start the discussions!

There are a number of keys to success for getting buy-in at the fenceline areas that are worth noting, including:

- Invite the fenceline staff to a short EMS awareness meeting. Senior management should be highly visible and involved in making the case for EMS and endorsing it as a priority. It needs to be perfectly clear to everyone that the EMS is a management commitment.

(Note: An EMS presentations from a wastewater organization is included in Appendix B).

- Drop by for brief informal discussions with supervisors, and managers and union stewards. Ask them what is going really well in their operation. Ask them where there might be some opportunities for improvement. It's probable that the EMS can facilitate some of the improvements in later implementation activities.

- Hang EMS posters and other informal awareness information on bulletin boards and in lunch rooms. One example of an interactive, fun tool, produced by MGMT Alliance, Inc., is available at http://www.mgmt14k.com/014kpizza.htm.

We'll be talking more about employee buy-in in later sections of the Handbook.

Understanding Your Organizational Goals

It's clear that implementing an EMS can lead to better environmental performance in your fenceline areas, as well as other important business benefits. Here are some of the organizational goals described by wastewater facilities we've talked to:

- Improve documentation and communications
- Develop and/or update standard operating procedures for field activities
- Improve morale and teamwork
- Increase efficiency of operations
- Reduce energy consumption
- Enhance the public image of the City or Agency
- Develop a process that would put us into a proactive role with regard to compliance instead of reactive
- Become more competitive
- Become "best in class" for wastewater

While there are some remarkable similarities among wastewater facilities, no two are exactly alike. An important first step in EMS readiness is understanding why your organization is implementing an EMS. Are you concerned about environmental performance? Do you want to improve your public image? Are you planning for succession issues as portions of your staff retire and new personnel must be trained and ready? Do you want better communication across your organization? Are you interested in green purchasing and product substitution options? Are you having problems meeting the expectations of the public?

Top managers should attend training sessions on EMS implementation. A facility EMS Steering Committee was formed with top management involvement. This committee was instrumental in developing and approving the EMS Policy and EMS level-one procedures.

Rick Bickerstaff
Charleston, South Carolina
Commissioners of Public Works

Senior management, as represented by the Public Works Director, has been directly involved with the EMS process by participating on the Core Team in the development of the EMS. In addition, he has kept the County Commissioners and the Sewer Advisory Board informed of the EMS progress with periodic briefings. He has attended EMS workshops and training and has reviewed all EMS documents, as they have been prepared and has talked to plant employees about the EMS.

Jim Newton, P.E., DEE
Kent County, Delaware
Levy Court Public Works

Division management directed that an ISO-14001 EMS be established and provided the economic resources to obtain necessary consultant support. Management created an environmental management representative position within the division and made the position comparable to other senior staff positions. Management heads up the EMS Steering Committee which meets on a regular (quarterly) basis and directs the production of a monthly division-wide activity report which highlights EMS activities. Management tracked the progress of EMS development on a continual basis over a two-year period until the EMS became registered.

Chris Toth
City of San Diego
Wastewater Collection Division

The General Manager introduced the concept of the EMS at a MSD board meeting. From there, the General Manager held organizational team meetings to discuss the goals of the organization (EMS was one of the goals discussed). During these meetings, the General Manager, along with the EMR, introduced the EMS and how it will merge into the business plan of the organization. The General Manager also approved a Steering Committee which consists of top management. Each member of the Steering Committee meets with their staff on a regular basis and reviews the concept and focus of the EMS.

James Naber
Buncombe County, North Carolina
Metropolitan Sewer District

It's extremely useful and informative to spend some time with various levels of staff and functions in your organization, particularly in your fenceline divisions, discussing what improvements each would like to realize in its respective areas of responsibility. The responses you get from senior management will be considerably different than those from the frontline folks, but all are important. Keep track of these organizational goals. Document them, and refer to them often as you build your EMS. Frequently ask yourself whether your EMS plans include activities that will help you reach your goals.

You'll secure enthusiasm and buy-in at all levels in your fenceline areas as employees across your organization see that the EMS is accomplishing improvements they have suggested. You'll also encourage employees to communicate fresh ideas about how your operations might continue to be improved.

Here are some examples of goals that managers from wastewater facilities considered important:

◆ Establish your organization as a leader within the wastewater sector

◆ Instill a proactive instead of reactive culture

◆ Improve communications internally and externally

◆ Enhance public image

◆ Capture and document institutional knowledge

Here are some examples of goals that frontline employees from wastewater facilities considered important:

● Enhance the environmental impact of operations by doing some-thing good for the environment in everyday work
● Improve communication between divisions and across functions
● Increase the use of best practices—performing activities better than industry standards
● Ensure that the organization is doing the right thing (i.e., complying with the law, etc.)
● Standardize procedures so that everyone is consistent and working together

As we've discussed in a previous section, the EMS integrates well with, and is also an excellent delivery vehicle for, other voluntary and required systems (e.g, Asset Management, CMOM, ISO 9000, Balanced Scorecard, QualServe, NBP, etc.) that your organization already endorses, so if your organization intends to adopt one or more of them, be sure to include that in your organizational goals as well.

Management Commitment, Involvement, and Visibility

One of the most important steps in the planning process is to gain top management's commitment and support to EMS development and implementation. It is critical that EMS commitment and support comes from both local (municipal) leadership and your organization's top management. In fact, experience has shown that public organizations who attempt to implement an EMS without top management support are unsuccessful.

Don't assume that top managers know all they need to know about an EMS. Just like the rest of your employees, senior managers need training. Short, frequent sessions that address managers' concerns and goals have been the most successful ways to keep management up to date on your EMS.

If your city managers or your wastewater management do not understand the potential benefits of an EMS, they probably will not have the incentive to follow through with implementation. During your preliminary discussions about the EMS, you'll want them to clarify management's specific goals for the EMS at your facility. You'll want to confirm that they understand the EMS implementation strategy and schedule you are using, the estimated direct labor commitment involved, and when, how, and what to communicate to employees on a regular basis. Every organization implementing an EMS has come to the same conclusion about management—**visibility, commitment, and involvement** are the **#1 keys to success**. Be sure your EMS plans include regular and frequent dialogue with management.

> **NOTE**
> On the political side, top management could include: the mayor, city manager, town board, city council or city commissioners. Top management on the facility side could include the division director, department head, or frontline managers.

Employees will react to management's actions far more than their words, so be sure that management understands their role in EMS development and implementation and that it involves being visible and involved, particularly in the beginning stages. Here's what wastewater facilities reported as management's most important roles and responsibilities:

- Providing input and approving the environmental policy statement
- Appointing the EMS Management Representative
- Approving EMS plans and programs
- Tracking EMS performance
- Being visible and involved in the EMS (e.g., showing up at team meetings and employee presentations)
- Communicating support of the EMS across the organization
- Regularly meeting with the Environmental Management Representative

CASE STUDY

Top Management from the City of Lowell, Massachusetts showed its support for EMS implementation by providing a financial incentive to employees within the wastewater facility when they successfully completed their EMS.

"Initial commitment was by the Assistant Superintendent of Wastewater Treatment and the Director of Public Works and Utilities. They saw the potential benefits to the organization and asked staff to investigate the program and then to begin development and implementation. Support also came through approval of the time for staff to develop and implement the program and then by the City Council through approval of the policy. The City Council and City Manager approve the EMS policy each year if the Management Review Board determines that a change is needed."

Beth Eckert
Gastonia, North Carolina

- Frequently asking employees at various levels and functions how the EMS is going
- Expressing personal goals for the EMS to the EMS leadership
- Using the "bully pulpit" carefully and only when needed to move the program forward
- Providing human as well as 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

Another management key to success is to send three or four "good news" bullets to senior management on a monthly basis. This keeps the EMS on their agenda, and provides information for them to report at their management meetings and through other outreach activities (e.g., conferences, newsletters, civic meetings, etc.).

EMS Program Leadership: the EMR, Core and Site (Implementation) Teams

As you've probably gathered by now, the EMS is not a program that one person can put into place. In fact, every employee in your fenceline will be involved in some way in building and maintaining your EMS. One of the first responsibilities that you as top management face is to appoint an EMS champion. That person is the EMS program manager and in EMS terms is called the Environmental Management Representative, or EMR. The EMR, sometimes with recommendations from top management, will appoint a cross-functional team of EMS program leaders called the Core Team. These are the employees from various levels and functions in the fenceline who will become additional EMS experts, and assist the EMR in designing, delegating, and evaluating EMS activities. A third level of EMS leadership are the Implementation Teams. These are the employees and staff who are closest to the actual work in the operations of your fenceline. They have a huge amount of institutional know how and operational experience that is critical to a strong EMS.

In some cases, organizations decide to add a Steering Committee. Members of the Steering Committee often include City Commissioners, City Managers, Mayors, Council Members, and Directors of other municipal utilities and services. The Steering Committee's job is to ensure that the EMS plans are consistent with the strategic vision of the city and to ensure that appropriate resources are allocated for the EMS.

Selecting an EMS Champion:
The Environmental Management Representative

The Environmental Management Representative (EMR) is the clearly-identified EMS team leader who has responsibility and authority for implementing and maintaining the EMS. The EMR has the designated authority from management to get the job done and is pivotal to the success of your program. The fact that the EMR represents top management and speaks with its authority should be clearly stated and

regularly repeated throughout the EMS implementation, particularly in organizations where the EMS hierarchy doesn't mesh with the organizational hierarchy.

It's a good idea to make sure that your EMR gets sufficient EMS training before beginning to build your EMS. This Handbook will be extremely useful for making contact with other wastewater facilities (or any relevant organization for that matter) who have implemented an EMS—EMRs are always happy to share their experience and keys to success.

To locate additional information, or contact any of the Steering Committee members that contributed to this Handbook, visit www.peercenter.net.

In addition to being the EMS expert and champion, it's also useful if the EMR has a good knowledge of the overall operations, strong project management and organizational skills, and is a good communicator up and down the organizational hierarchy. The most successful EMRs are enthusiastic team players who are trusted and respected by all levels of staff. A sense of humor is always an added bonus.

The EMR typically assumes the new EMS responsibilities in addition to their existing responsibilities. In four out of the six wastewater facilities contributing to this Handbook this was the case. Be sure management understands the number of hours involved and is willing at times to redistribute some responsibilities to others in the organization. Charts have been included within this section for the EMS roles and number of hours the wastewater facilities that consulted for this guide spent in implementing their EMSs.

Typical EMR Responsibilities

The EMR is the project leader for the EMS and is essential to successful implementation as the EMS driver and key communicator. In addition to typical project manager responsibilities, the EMR can anticipate the following activities:

- Build and lead the EMS Core Team
- Plan the EMS project and implementation schedule
- Gather, organize, and disseminate 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

EMR Qualifications

- ❖ Knowledge of organization's business and management practices and core operations
- ❖ Environmental background
- ❖ Leadership and project management skills—team builder
- ❖ Systems thinker
- ❖ Good communicator up and down the ladder—relates to all levels of staff

NOTE

Experience with public organizations that have implemented an EMS has shown that EMS Core Teams have 2-12 members, with an average of 7 people. Consider including contractors, suppliers or other external parties as part of the Team, as appropriate.

The Teams definitely need to be cross-functional, have buy-in into the program, and have the time to perform the tasks that were assigned to them. I think if we had to do it over again, and what we have done since initial development, is to create an EMS Team that is composed of a more diverse level of staff. Initially, all members were supervisors and now our group includes laboratory technicians, operators, assistant managers, and supervisory level staff. The buy-in from the frontline employees comes easier the more they are involved in the process.

Beth Eckert
Gastonia, North Carolina
Public Works and Utilities Department

The Core Team

The **EMS Core Team** plays an important leadership role in planning the EMS project, delegating the tasks, establishing deadlines, collecting and evaluating work, and providing training, guidance and assistance as needed. The EMR heads the Core Team, and its members are an organization's EMS experts and champions.

Some organizations enlist volunteers for their team; others delegate and assign members to the Core Team. Keep in mind that the Core Team also needs the authority as well as responsibility to drive the EMS.

If your organization cannot get enough volunteers on the Core Team, consider making membership on the Team a prestigious honor. Get Top Management to recognize your EMS Core Team members. "Congratulations, you've just been selected to our EMS Core Team!"

Wastewater Organization	Establish a Core Team?	# of Members *
Buncombe County, North Carolina Metropolitan Sewer District	Yes	7
Gastonia, North Carolina Public Works	Yes	8
San Diego, California Metropolitan Sewer District	Yes	10
Kent County, Delaware Public Works	Yes	8
Eugene, Oregon Public Works	Yes	8
Charleston, South Carolina Public Works	Yes	12

* The size of your Core Team will depend on your organizational structure, specific employee skills and expertise, and your organization's available resources.

COACH'S CORNER

An EMS Core Team should include cross-functional (e.g., engineering, finance, human resources, operations, etc.) representation and include members from top to bottom of the organization (i.e., management to the frontline). Members can even be pulled in from operations outside the scope of the EMS fenceline.

A cross-functional team can help to ensure that procedures are practical and effective and can build commitment to and "ownership" of the EMS.

CASE STUDY

Charleston, South Carolina Public Works adopted a two-pronged approach. They first assembled a 12-person Steering Committee consisting of all department heads to obtain management buy-in. Second, they established local in-house EMS committees for functional areas, such as a local team for wastewater collection, one for wastewater treatment, etc.

REMEMBER

It takes time for the EMS Core Team to develop a team dynamic. Give yourselves time to "gel" and work together as a team. At first, have team meetings with some simple and non-threatening EMS activities. For example, work together on issues such as clarifying the meaning of key EMS terms and EMS jargon.

EMS Core Team Qualifications:

- "In the know" in their operational and functional areas
- Good communicators and listeners
- Enthusiastic and committed
- Respected and trusted by employees and managers

Implementation or Site Team(s)

The majority of public organizations that have implemented an EMS have also chosen to assemble an EMS implementation or site team—or several teams—to help with the development of various EMS elements. The make-up of the implementation teams typically consists of personnel from the frontline—personnel that are responsible for the activities and operations that generate potential significant environmental impacts.

View the establishment of an Site Team as an opportunity to secure buy-in at all levels of your organization. By involving staff in the EMS Implementation Team activities (e.g., environmental analysis), you can have greater assurance of their support and assistance.

Wastewater Organization	Establish a Site Team?	# of Members
Buncombe County, North Carolina Metropolitan Sewer District	Same as the Core Team	
Gastonia, North Carolina Public Works	Yes	8
San Diego, California Metropolitan Sewer District	No	--
Kent County, Delaware Public Works	Same as the Core Team	
Eugene, Oregon Public Works	Same as the Core Team	
Charleston, South Carolina Public Works	Yes	8

Typical Site Team Responsibilities:

- Documenting the organizational activities/operations as process flow diagrams
- Assisting with the identification of environmental impacts
- Providing input on environmental objectives
- Developing work instructions and/or standard operating procedures for activities or operations that were identified as significant
- Disseminating information and good news about the EMS effort— acting as EMS champions for their area of operation

NOTE
Based on your wastewater facility size, you may not need both an EMS Core and Site Team. For three of the six of the wastewater facilities that consulted for this Handbook, the Core and Site Teams were the same.

It was definitely a plus to have a cross-sectional representation involved on EMS Team(s).The EMS Team members selected brought forth knowledge and expertise from their departments. The members were willing to learn and grow, and they also wanted to be involved with and be part of creating a culture shift (TQM, EMS) affecting the organization.

James Naber
Buncombe County, North Carolina
Metropolitan Sewer District

EMS Core and Site Team Keys to Success

- Ask for volunteers—if there are none, have section managers make appointments. They know the leaders.
- Make responsibilities clear to employees and to their managers.
- Reward/recognize their involvement.
- Secure their time commitment from management—be aware of peak operational times.
- Sometimes include the "bad apples" on the implementation team as a way to alleviate dissension at the pass.

Initially, frontline employees were not involved. They slowly became involved as the EMS implementation moved along. Based on initial discussions with many of these staff members, their initial reaction to the program was that it be put up on a shelf and forgotten about. However, discussions with staff as the implementation progressed revealed that many of the employees were seeing potential benefits to personally and professionally and discovering how they can use the program to help them do their job better.

Beth Eckert
Gastonia, North Carolina
Public Works and Utilities Department

CASE STUDY

An Associate Recognition Program is in place for employees at the Charleston, South Carolina CPW. Under the Program, employees are nominated by other employees and management, based on productivity, contributing to goals, and being team-oriented and positive. Awards include peer recognition, cash, and parking privileges. A copy of Charleston's Associate Recognition Program is attached in Appendix B.

Lessons Learned Regarding Core and Site Teams

(from wastewater facilities):

- Don't pressure anyone not willing to serve.
- Be clear that each team member understands their role.
- LISTEN to concerns and try to address, don't dismiss, concerns early–catch and try to alleviate these concerns before they get back to the frontline.
- Let team members know that their opinions matter.
- Conduct team-building exercises to build a team dynamic.

Securing and Maintaining Employee Buy-in

The same concepts that you used for enlisting the support of your fenceline managers, supervisors, and union stewards can be applied to getting employee buy-in. Some employees may view an EMS as bureaucracy, the "flavor of the month," or added work or expense. There also may be resistance to change or fear of new responsibilities. To overcome these potential barriers, make sure that everyone understands why the organization needs an effective EMS, what their role is and how an EMS will help to control environmental (and safety) impacts in their areas and in day-to-day operations.

Get key employees involved in the EMS early and often. While the EMS is not technically challenging, the introduction of new ideas can be threatening for employees. Therefore it's important to get employee support from the beginning through ongoing, consistent, open dialogue on your EMS. Employees should understand what the organization wants the EMS to accomplish. This can go a long way toward gaining that support and answering the question of "what's in it for me?"

CASE STUDY

An EMS Commitment Statement was prepared and signed by all employees at the Charleston, South Carolina CPW (a copy is attached in Appendix B).

Communicate and ask employees for their EMS goals during the planning stages and throughout EMS implementation. Open employee dialogue, buy-in, and involvement will help ensure that the EMS is realistic, practical and adds value.

NOTE

3 of 5 = number of wastewater treatment facilities from the Wastewater Steering Committee that involved frontline employees during the initial stages of EMS planning and development.

EMS implementation requires participation by more than a single individual to be successful. Ultimately, your organization will want to institutionalize the EMS and create an atmosphere or culture where environmental management becomes business as usual across all day-to-day activities. Therefore, involving cross-sectional employees early in the planning of the EMS is the best way to promote short- and long-term commitment throughout the organization. Plus, it's a great way to gain support and ensure buy-in for the EMS.

Ideas for building a team approach to the EMS and involving employees from the very beginning include:

- Holding a kick-off meeting and invite top management; this helps everyone see the EMS as a priority.
- Talking the EMS up with employees, union stewards, middle managers, 2nd shifters, etc.
- Spending time talking with middle management and line supervisors. One-on-one conversations can identify their needs, concerns, and problem areas. The more your middle managers are involved in the initial stages of the EMS, the more support and buy-in you will get.
- Asking employees on the front-line what changes they would like to see in their operations as a result of the EMS (See Appendix B for a list of questions that a public works organization used in getting support and buy-in fromfrontline employees). However, don't over-whelm them with EMS "jargon."
- Posting EMS signs on bulletin boards, lunch-rooms, and near coffee and copy machines to familiarize staff with EMS words and the ideas.
- Advertising early successes to keep management and employees aware of EMS efforts.

CASE STUDY

At the Buncombe County, North Carolina MSD, employees from the very beginning were asked for their operational expertise and what they wanted to get from an EMS. Buncombe employees soon realized their ideas and efforts could make a difference.

Conducting an EMS Gap Analysis

Of all of the activities in the Getting Ready Phase, the Gap Analysis is your EMS leadership team's first foray into the actual world of EMS jargon and the requirements of a formal EMS. The Gap Analysis provides a current baseline assessment of the degree of conformance of existing policies, procedures and practices to standard EMS requirements.

Your EMS Gap Analysis will probably show that you have a number of EMS elements in place. Remember—you don't have to start from scratch!

We worked to provide employees with the necessary tools (e.g., standard operating procedures) to successfully and consistently complete their work. With communication and documentation in place, change became easier and smoother. Allow time for employees to absorb information and adapt to change.

Chris Toth
City of San Diego
Wastewater Collection Division

COACH'S CORNER

Use your EMS Gap Analysis as a project planning and a communication tool. The Analysis will allow you to scope and budget the EMS effort by identifying your EMS gaps and by providing a preliminary level of effort to fill the gaps. Since this is typically the first exposure personnel have to the EMS, the EMR and Core Team, use the Gap Analysis to increase employee EMS awareness, communicate useful information about environmental issues to top management and frontline employees, and teach everyone about the basic EMS elements.

It's recommended that the EMR, and some members of the Core and Implementation Teams conduct the Gap Analysis, and that these team members have a basic understanding of the EMS before they begin. It's also a good idea for top management to communicate to managers, directors, union stewards and supervisors—well in advance—what the gap analysis is, the reasons for doing it, and when it will take place. Schedule the Gap Analysis at a time convenient to fenceline managers if possible.

Conducting the Gap Analysis in-house rather than hiring an outside consultant is preferable for several reasons. First, it's a great tool to familiarize your Core Team and your EMR with the language of the EMS and the 17 requirements that make up the Plan-Do-Check-Act cycle. Second, it's an activity that allows the EMR to delegate some of the responsibility to several Core Team members, and to evaluate the skill set of the Core Team. Third, it's a good opportunity for the Core Team to work together for the first time to accomplish an important EMS milestone; and fourth, it's a great tool to open a dialogue between the Core Team and the Implementation Teams about the plans, procedures, SOPs, and records that currently exist in operational areas.

Finally, once you have completed your Gap Analysis, you'll have a good idea of how much work your organization needs to do to complete the EMS, and that will help you to allocate human and financial resources appropriately.

At the end of the Gap Analysis you'll have improved your Core Team dynamic, increased employee EMS awareness, communicated useful information about environmental issues to your senior management, and learned a lot about EMS elements and the scale of the implementation effort.

Wastewater Organization	Was a Gap Analysis Conducted?	Did you Use a Checklist?	% of EMS Elements in Place	Typical EMS Elements that were in Place
Buncombe County, North Carolina Metropolitan Sewer District	No	No	20%	> Legal & Other Requirements > Monitoring and Measurement > Operational Controls > Standard Operating Procedures > Environmental, Health & Safety (EH&S) Training > Emergency Response Various EH&S Records > Management Review
Charleston, South Carolina Public Works	Yes	Yes	40%	
Eugene, Oregon Public Works	Yes	Yes	40%	
Gastonia, North Carolina Public Works	Yes	Yes	15%	
Kent County, Delaware Public Works	Yes	Yes	60%	
San Diego, California Metropolitan Sewer District	Yes	Yes	10%	

What to Look for in the Gap Analysis

The protocol (or checklist) that you can use for the Gap Analysis will direct you in your efforts. You will review documentation, interview personnel, and assess whether you have documented procedures for internal and external communication, training, and management review, etc.

See Appendix B for an example EMS Gap Analysis Checklist.

The information you capture from the gap analysis will save you time further down the road and eliminate duplicating what already exists. Develop a gap report based on your findings and report to top management.

Managing Change: It's NOT Easy!

As you move forward with your EMS, you'll begin to realize that the challenge is not with technical issues but rather with organizational change. Most organizations don't like change. Managers, directors, and employees all are quite comfortable with the status quo.

"Change is good...but you go first!"

Managing change is an important factor in EMS implementation, and the entire EMS leadership must be involved. The Steering Committee and top management facilitate change by clearly showing through frequent communication and through their involvement early on in EMS awareness activities that the EMS is a priority for the organization and one that has their personal attention. The EMR, Core Team, and Implementation Teams are the change agents that are closest to the workforce. They must be ready to listen and respond to concerns and fears that the workforce expresses, for these issues are not ones to be swept aside or discounted. Ideally the EMS teams that you have selected will be staffed by people who have earned the trust and respect of their peers and colleagues. That is an important key to success in change management.

> **NOTE**
> As new elected officials (e.g., City Managers or Council) or senior managers at your facilitiy come on board, there may be the perception that the EMS is not "their" initiative. This can result in reduced support and resources for the implementation effort. It's very important to educate the new leaders early on about the associated benefits of your EMS to secure their buy-in and support.

Brainstorm with your Core Team and Site Teams about the times when change went really well in your organization. What lessons can you learn from that experience that you can apply to the EMS program? Then recall a time when change went really badly in your organization. Apply these lessons to the EMS program as well.

Wastewater and Other Public Organizations' Keys to Success for Managing Change

- Secure active support/ interaction from management
- Establish early dialogue and lines of communication
- Define opportunities for ownership and empowerment (e.g., incentive programs, etc.)
- Maintain consistency— keep EMS on the radar/visible
- Promote activity and involvement (e.g., an EMS comment box)

"Our organization learned that change could be a good thing and not something to be afraid of. We also learned that communication (two-way communication) with all relevant levels of staff can help to make changes smoother and more positive. It is amazing the different perspectives the various levels of staff have about what management may consider to be the most minor change and that if given the opportunity to be heard, how eager staff is to share their opinion."

Beth Eckert
Gastonia, North Carolina
Public Works and Utilities Department

A Few Words About EMS Language/Jargon

The language/jargon of an EMS is typically a hurdle at the beginning of the EMS process. Words like "aspect," "significance," "target," etc. have a specific meaning that is not necessarily intuitive or consistent when you begin your EMS implementation.

REMEMBER

Spend time with your EMS Core Team unlocking the meaning of certain EMS terms—this will save you hours down the road. Also, pass these language lessons on to managers and employees while conducting the gap analysis or during monthly all-hands meetings, etc.

You've conducted your Gap Analysis, obtained commitment and support from management, formed your EMS leadership teams, and given some thought to change management. Your Getting Ready Phase of EMS implementation is almost completed. Two more tasks await you: becoming acquainted with the strategy you'll use to implement the EMS and finding information resources and materials that will help you prepare your organization to build the EMS.

Understanding the EMS Implementation Strategy

The strategy used in this Wastewater EMS Handbook is one used successfully by over 50 organizations across the United States. It's a dynamic strategy, because it reflects the most current lessons learned, improvements, tools and materials that many different public agencies have gathered from the experiences of wastewater utilities and other public facilities like yours.

One way to describe the strategy is "just-in-time" implementation. As previously mentioned, when you are involved in a particular phase of EMS activity, there is no need to look ahead to what will happen in the next phase. We urge you to stay focused on the EMS milestones in the current phase. As you complete each milestone, you are one step closer to a complete and thorough EMS. The activities in each phase are designed to sequentially build a strong and thorough EMS.

While the EMS that you are building can certainly apply to any EMS based on the Plan-Do-Check-Act approach, this Handbook and implementation strategy are based on the ISO 14001 Environmental Management System. Should you determine at a later date that 3rd-party verification of your EMS is a sound business decision, you will have addressed all the elements described in the ISO 14001 EMS.

Here's an example program plan that describes the five phases of EMS implementation:

Begin ➡️ **End**

Phase 1: Getting Ready (~3 months)	Phase 2: Planning (~6 months)	Phase 3: Implementing (~9 months)	Phase 4: Checking & Corrective Action (~5 months)	Phase 5: Management Review (~1 month)
• Commitment • Awareness • ID Goals • EMR & Team Selection • Gap Analysis • Game Plan	• Policy • Legal & Other Requirements • Significant Aspects ID • Objectives & Targets • EMPs	• Managing Significant Aspects (Operational Controls) • Training • Documents & Records (SOPs, WIs, etc.) • Emergency Preparedness & Response • Communication • Roles & Responsibilities	• Monitoring & Measurement • Compliance Status • Internal & External Reviews • Corrective Actions • Preventative Actions	• Judge the suitability, adequacy, and effectiveness of the EMS • Consider new organizational goals • Apply lessons learned for continual improvement

One question often asked is how long the implementation will take and how much direct labor and other resources your organization will commit. The timeline for waste utilities that have successfully implemented an EMS has averaged 12 - 24 months. Less time than that for implementation would require a huge amount of resources; longer than that detracts from the motivation and energy of the process. The time it takes your facility to implement an EMS will vary, depending on the length of the time for each phase of activity, operational and business realities that intrude on your normal workflow, and many other change issues that wastewater facilities are faced with each day. The timeline provides an average time of each phase. Here's some additional information from wastewater facilities around the country:

Wastewater Organization	Size of Facility (in Millions of Gallons/Day = MGD)	Time in Months (from EMS Project Start to 1st Management Review)
Buncombe, North Carolina Wastewater Plant	40 MGD	22 Months
Buncombe County, North Carolina Metropolitan Sewer District	20 MGD	13 Months
Charleston, South Carolina Wastewater Collection System Department	40 - 74 MGD	18 Months
Charleston, South Carolina Environmental Resources	< 40 MGD	24 Months
City of Eugene, Oregon Wastewater	49 - 75 MGD	18 Months
Gastonia, North Carolina Wastewater - 2 treatment plants (includes a laboratory, the pretreatment program and a biosolids program)	6 MGD 16 MGD	18 Months
Kent County, Delaware Wastewater	15 MGD	Currently implementing an EMS
San Diego, California Operation & Maintenance Division	> 75 MGD	18 Months
San Diego, California Metropolitan Wastewater Collection Division	> 75 MGD	30 Months

These implementation averages will help you guide your organization through the EMS process. While they are specific to each organization, they should help you plan your program structure and prevent you from spending too much time on any one phase.

Another question asked by top management concerns the amount of direct labor support the EMS implementation will require. A rough average is 12 hours of time per year for each employee in your organization. Certainly your receptionist will probably not spend as much time on the EMS as your EMR or Core Team members, but over each year the total hours expended has held to this average. Direct labor costs to maintain your EMS will shrink considerably as the EMS becomes business as usual.

Here's some information about the resource commitment of wastewater facilities interviewed for this Handbook:

Wastewater Organization	Total Labor Cost	Total Consultant Cost (if applicable)	Total Cost to Implement (Labor, travel, materials, and consultants)	Wastewater Average Staff Time (EMS Project Start to 1st Management Review)
Buncombe, North Carolina Wastewater Plant	$50,000	$35,000	$94,000	3,300 hours
Charleston, South Carolina Wastewater Collection System Department	Not Available	Not Available	Not Available	1,675 hours
Charleston, South Carolina Environmental Resources	Not Available	Not Available	Not Available	1,675 hours
City of Eugene, Oregon Wastewater	$85,000	$21,000	$120,000	4,300 hours
Gastonia, North Carolina Wastewater (2 treatment plants, a laboratory, the pretreatment program and a biosolids program	$51,800	Not Applicable	$53,800	Not Available
San Diego, California Metropolitan Wastewater Collection Division	$211,000	$90,000	$308,000	6,200 hours
San Diego, California Operation & Maintenance Division	$200,000	$160,000	$365,000	Not Available

Discuss with your management, your Core Team, and your Implementation Team a timeline that you feel is appropriate for your organization. Refer to your Gap Analysis to get a general sense of how much work needs to be done and the anticipated size of the program.

A list of key EMS implementation activities and the month they were completed by the wastewater facilities that contributed to this Handbook is attached at the end of this section.

EMS Roles and Hours Dedicated to EMS Implementation

Roles	Hours (from project start to completion of first management review)
Environmental Management Representative (EMR)	Average hours = 2,100 Range of hours = 1,000 to 3,000
Senior Management	Average hours = 30 Range of hours = 8 to 100
EMS Core Team	Average hours = 2,050 Range of hours = 1,800 to 2,500
Consultant(s)	Average hours = 315 Range of hours = 100 to 500

EMS Information Sources and Resources

The Getting Ready Phase involves educating many levels of employees in your facility: managers, the EMR, EMS leadership teams, and employees. This process of learning more about an EMS doesn't end in this phase, but continues throughout each of the subsequent phases. Assembled in this Handbook are excellent lists of information resources, some of which are contained in Appendix C of this Handbook; others are available on the Internet.

Some additional EMS Implementation Guides that have served wastewater utilities and other pubic entities over the past seven years include:

EMS: An Implementation Guide Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor, Michigan, January 2001.

An EMS Troubleshooters' Guide for Local Governments, Global Environment & Technology Foundation, Arlington, Virginia, October 2002.

The Internet is an excellent source of EMS information. One site that caters specifically to public entities implementing an EMS is the Public Entity EMS Resource Center—the PEER Center—Website at www.peercenter.net. Linked from the PEER Center are seven Local Resource Centers across the United States. Each has experience and expertise in facilitating EMSs in public entities.

Moving to the Next Phase

Congratulations! You have brought your organization through its first phase of EMS implementation. Here's a checklist of the EMS Milestones you've accomplished:

- ✓ Choosing your EMS "fenceline"

- ✓ Understanding your organizational goals

- ✓ Confirming top management commitment, involvement, visibility

- ✓ Selecting an EMS champion

- ✓ Building EMS teams

- ✓ Securing employee buy-in

- ✓ Conducting a Gap Analysis

- ✓ Managing change

- ✓ Understanding the implementation strategy

- ✓ Accessing EMS tools and information

Things to Avoid

1. Overburdening employees with EMS implementation tasks during peak operational periods.

2. Using EMS "jargon" when communicating with employees (e.g., instead of environmental aspect/impact, try cause/affect).

3. Waiting until the EMS management review to involve management in the EMS. Provide brief monthly reports/updates on the status of implementation to get management involved early on.

4. Stalling during your EMS planning—stick to a regular pace so that your employees remain engaged and interested in the EMS process.

5. Establishing implementation time frames that are unreasonable—don't bite off more than you can chew.

NOTE
Additional sources of EMS information that the Wastewater Steering Committee found useful are in Appendix C.

As you complete this phase, it might be useful to document the lessons your EMR, Core Team and Implementation Teams have learned. What barriers did you experience? What benefits have you seen?

Some of the documents that you will have generated in the Getting Ready Phase include:

An EMS organizational chart showing the functions of those who serve as your EMR, your Core Team and Implementation Teams and, on your Steering Committee, if you have one.

A gap analysis showing what you already have in place that conforms to an EMS, and the areas that provide opportunities for improvement.

A list of **organizational goals** at the various levels and functions of your fenceline.

A tentative **timeline of EMS implementation** that is appropriate for your organization.

A list of **wastewater facility contacts** who have implemented an EMS in their own organizations.

A list of **public and private organization contacts** in your area who have implemented an EMS.

Your favorite **Websites** for EMS tools, materials, and information.

Barriers you have experienced in this phase.

Benefits you have experienced in this phase.

Lessons learned about implementing an EMS in your organization.

In the next Section of this Wastewater EMS Handbook, you'll find step-by-step guidance to help you and your EMS Leadership Teams accomplish the EMS milestones in each of the subsequent EMS phases. We hope you will take the time to share your experiences, data, case studies, lessons learned and keys to success with other wastewater facilities who will consider EMS implementation in the future.

Best of luck!

> *It was learned early on that a phased approach to our EMS implmentation was attainable and suitable to the needs of our organization. We didn't want to bite off more than we could chew.*
>
> James Naber
> Buncombe County, North Carolina
> Metropolitan Sewer District

COACH'S CORNER

Methods used by other EMS Wastewater Practitioners to Promote Familiarity/Awareness of their EMSs—Let's borrow from their EMS Playbook!

1. Post EMS awareness signs and aspect/impact lists, objectives and targets, etc. on bulletin boards and throughout buildings, access areas, lunchrooms, and break rooms.

2. Use brochures, EMS videos, and EMS awareness reference cards.

3. Conduct EMS awareness training and hold face-to-face meetings.

4. Develop an EMS newsletter and monthly activity reports.

5. Create EMS information Websites.

6. Send emails on EMS basics that go out to all employees.

7. Hold an EMS slogan contest with a day of vacation as a prize to the winner.

8. Create an EMS character, catchy EMS acronym, and a simple message to inform employees about the EMS.

9. Develop creative and fun ways to present the EMS—kitchen magnets, screen savers, etc. with the EMS logo/character/acronym.

Lessons Learned

1. Keep EMS staff and core team meetings focused and efficient (provide food as an incentive!).

2. Implement a document control system for your procedures, documents and records early on in the EMS implementation process.

3. Contact other wastewater treatment facilities and other public organizations that have implemented an EMS to benefit from their knowledge. They are eager to share their insights.

4. Communicate implementation successes early on to help motivate management and all employees to the benefits of an EMS.

5. Make the EMS "system" dependent and not "person" dependent.

Frequently Asked Questions about Environmental Management Systems

Q. Where in my operations would an EMS be appropriate?

A. An EMS can be applied in one or more departments or operations across an organization. You should examine the organization's activities and services and determine where the EMS would best serve needs and organizational goals. The department(s) or facility(ies) to which you apply the EMS is called the "fenceline".

Q. To implement an EMS, do we have to start from scratch?

A. Much of what you have in place now for environmental management probably can be incorporated into an EMS. There is no need to "start over" and re-invent the wheel for environmental and other organizational programs that are in place. A gap analysis is a great way to determine what parts of an EMS may already exist. *See Appendix B for a Gap Analysis Checklist.*

Q. What is the purpose of an EMS Gap Analysis?

A. The requirements of an EMS are compared to an organization's current management and environmental programs. The gap analysis is used to determine EMS program priorities and for planning the path ahead for implementation.

Q. What is it going to cost to implement an EMS at my wastewater facility?

A. The cost of implementing your wastewater EMS will vary depending on the size of your facility (fenceline), if you use consultants, and the number of policies, procedures, work instructions, etc. you already have in place that meet the requirements of an EMS. Note the dollar and human resources spent on EMS implementation from wastewater facilities on page 36 of this Section. Use the lessons learned and keys to success from other wastewater organizations that have implemented an EMS and to use this Handbook as a resource.

Q. Can I implement an EMS without consultants?

A. Yes—although your current consultants can be a valuable resource for reviewing environmental compliance and assisting with other EMS tasks, we recommend you use them only as needed for the EMS. Remember, this is **your** EMS. Take ownership of your EMS by involving your own management and staff in implementation activities.

Q. Where can I find additional help on EMSs, especially in the wastewater sector?

A. The Wastewater Steering Committee that contributed their knowledge to this Handbook are providing you with a support network as you implement an EMS at your wastewater facility. Their POC information is listed in the front of this Handbook.

Appendix C contains EMS Websites and other excellent resources, some specifically tailored for wastewater and/or public organizations.

In addition, the Peer Center Website (www.peercenter.net) is specifically customized for the public wastewater industry, and therefore, will contain EMS tools, case studies, references, POCs, etc... for wastewater managers.

Phase II: PLANNING

You are now ready to begin the Planning phase of the EMS cycle. Each section of this Handbook will guide you step-by-step through each of the EMS activities. Refer to the icons for case studies, sample documents, keys to success and other implementation assistance. At the end of each section, two handy reference sheets review the **Purpose** of each requirement, describe the **Results** you'll be developing, discuss how to **Prepare** to do the work, and show how the element links to other EMS requirements.
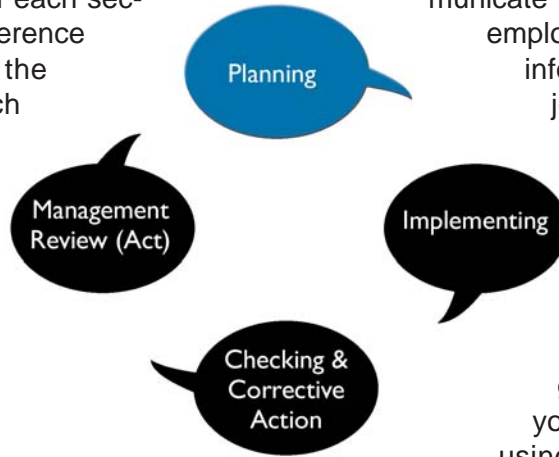
In this phase, you will be developing a formal environmental policy, essentially a vision and mission statement that describes your organization's commitment to the environment and is the foundation for your EMS planning and action.

Next you'll conduct a thorough assessment of how the operations in your fence-line impact the environment, and identify which of those impacts is most significant. You will review how you stay current with the laws and other requirements that guide your operations and how you communicate this information to the employees who need the information to do their jobs effectively. Finally, you will be setting environmental performance improvement objectives and measurable targets, and then establishing programs to accomplish your goals. If you are using a two-year implementation strategy, the activities in this phase can be comfortably accomplished in about six months.

Here's a checklist of requirements in this Phase:

Phase II EMS Requirements (6 months)	
Environmental Policy	✓
Legal and Other Requirements	✓
Aspects and Impacts	✓
Objectives and Targets	✓
Environmental Management Programs	✓

Section 3: Environmental Policy: Setting the Stage

An environmental policy is your organization's statement of its commitment to the environment. It is signed by top management and serves as a foundation document for your EMS and provides a vision for your entire organization. Everyone in the organization should understand the policy and what is expected of them in order to achieve your environmental goals. Use your policy as a framework for planning, action, and continual improvement—all else that follows will be based on your policy.

As you develop your EMS policy, it is critically important that the policy be consistent with other strategic environmental priorities you may have established through organization-wide strategic plans or other similar efforts. Don't make the mistake of having your EMS policy "exist in a vacuum." For example, you may have already embarked on major effort to improve the management of your capital assets through a formal assets management program. Make sure this commitment is reflected in your EMS policy and made part of your EMS throughout.

ISO 14001 Environmental Policy Commitments:

- Continual Improvement
- Pollution Prevention
- Compliance with Relevant Laws and Regulations

Step-by-Step Guide to Developing an Environmental Policy

Step 1) Review Current Policies
Step 2) Draft an Environmental Policy
Step 3) Check Your Environmental Policy for
    EMS Conformance
Step 4) Finalize Your Environmental Policy
Step 5) Communicate Your Policy
Step 6) Review Your Environmental Policy for Effectiveness

Step 1) Review Current Policies

You probably have some type of environmental or other organizational policies in place, even if they are not written down. For example, your organization is most likely committed to complying with environmental laws. Document what you have in place as a starting point. Leverage your current policies, build on them, and develop your environmental policy.

If no policy or language exists, you will need to draft a policy from scratch. There are plenty of examples your team can review to get

Key Section Terms
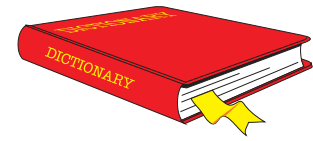
Continual Improvement – The process of enhancing an organization's EMS to achieve improvement in overall environmental performance in line with the organization's environmental policy. The basic principle of the plan, do, check, act approach.

EMS Core Team – A cross-functional team made up of individuals within the organization that helps facilitate EMS implementation across the organization. Team members are the EMS experts and cheerleaders.

Environmental Management Representative (EMR) – The clearly identified EMS team leader who has the responsibility and management authority for implementing the EMS from start to finish.

Environmental Performance – Measurable results of the EMS related to an organization's control of its environmental aspects, based on its environmental policy, objectives and targets.

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 and 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.

▶ Posting the policy at various sites throughout the work place (e.g., in lunchrooms) so there is a visual reminder of the statement and its importance

▶ Using paycheck stuffers, identification badges, wallet cards, etc. so that employees can carry the environmental policy with them

▶ Incorporating the policy into training classes and materials

▶ Referring to the policy at staff or all-hands meetings

▶ Posting the environmental policy on the facility's Internet

"Pull together a representative, cross-functional group from your organization when developing the policy and you'll have more buy-in of your EMS policy from every level."

Beth Eckert
Gastonia, North Carolina
Public Works and Utilities Department

Involving Contractors and Temporary Staff

Contractors and temporary staff that work within your EMS fenceline are required to be trained on and understand your environmental policy. Most wastewater facilities that have an EMS conduct a shorter version of their EMS awareness training for their contractors and temporary staff that includes a site safety review and an overview of the EMS and the environmental policy.

started, including an example policy at the end of this section and examples from wastewater organizations are included in Appendix A. Avoid developing a policy that is vague or could apply to any organization. Your policy should be specific to the goals you want to accomplish.

Step 2) Draft an Environmental Policy

Once you have your EMR and EMS Core Team in place, create a draft environmental policy based on any current business commitments and/or organizational and environmental goals. Remember that conformance to ISO 14001 must include statements regarding the three key commitments noted above.

Designate a couple of EMS Core Team members to be responsible for your draft policy. Get input from top management and seek input from employees. It is important that your policy reflect your organizational culture and that it is appropriate to all levels of your operations and services.

A sample Environmental Policy is attached at the end of this section. Additional sample policies from wastewater facilities are attached in Appendix A.

NOTE

Before you finalize your environmental policy, consider sitting down and brainstorming how your facility impacts the environment (your "footprint") and draft a few goals that you would like to achieve with your EMS. Identifying a few environmental goals before you finalize your policy will allow you to see how your wastewater facility considers environmental goals in line with business objectives. This approach will result in a policy that is specific to your organization and what you want to accomplish, rather than a "cookie cutter" policy.

Step 3) Check Your Environmental Policy for EMS Conformance

Check ✓
1. Is there top management support and a signature/date?
2. Is there a commitment to legal requirements, continual improvement & pollution prevention?
3. Is the policy communicated to employees? How?
4. Has the communication to employees been effective? (i.e., do employees understand the policy and their roles and responsibilities in the EMS)?
5. Is the policy available to the public? How?

Step 4) Finalize Your Environmental Policy

Once you have considered what you want to accomplish environmentally as an organization and checked your policy for conformance, finalize your policy by having top management sign, date, post, and communicate it. This shows commitment from the top.

COACH'S CORNER

Keep your environmental policy simple, understandable, and to the point. One quick test: Could your employees describe your policy statement in a few words?

Step 5) Communicate Your Policy

Once your policy is signed and approved, communicate it to your employees. Make sure that all employees understand the policy and how it relates to their work.

Conduct training to introduce the environmental policy to your employees, explain its purpose, and answer any questions. This can be done in separate training sessions and/or by incorporating training on the policy into other ongoing training (e.g., health & safety, environmental refreshers, etc.).

Case Study

Kent County Levy Court Public Works Wastewater wrote their policy to reflect an acronym that all employees could remember. They also added a symbol to help remember the acronym. In addition, they gave every fenceline employee a kitchen magnet with the policy information on it, and are considering placing the information on insulated mugs and mouse pads made from recycled materials. Kent County's Policy mascot, abbreviated policy, and acronym (CHIRP) are:
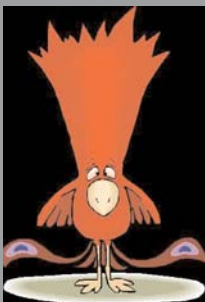
Environmental/Biosolids Policy

- ▶ **C**omply with regulations and NBP Code of Good Practice
- ▶ **H**ave an environmental/biosolids vision
- ▶ **I**mprove continuously
- ▶ **R**eadily share information
- ▶ **P**ractice pollution prevention

Three Lessons Learned
(from wastewater facilities):

1. Keep your policy simple. A simple policy written with specific expectations provides employees with a straight-forward and realistic view of your environmental and EMS purpose.

2. Include employees from across your wastewater facility when drafting your policy. Have a couple of Core Team members and management representatives draft your statement, then refine and finalize your policy based on feedback from the entire Core Team and staff at all levels. This will help secure employee buy-in.

3. Make sure your policy uses key words from the ISO 14001 Standard (e.g., pollution prevention, continual improvement, and compliance), especially if you are working toward third-party certification.

Three Things to Avoid
(from wastewater facilities):

1. Creating a policy that is too long. A lengthy policy makes it difficult for employees to identify the most important points. Make it one page or less.

2. Not defining your wastewater fenceline (core operations and services) before drafting your environmental policy.

3. Rushing your drafting process. Spend time drafting your policy since it really defines management's commitment to the EMS and sets the framework for development of your EMS.

1. Don't start from scratch. Use existing policies and organizational goals to document and expand your environmental policy. This will lead to positive, organization-wide acceptance.

2. When training your 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 basics of your wastewater environmental policy.

3. When developing your environmental policy (and your EMS), it is critical that top management listen to the working conditions and concerns of all employees.

Common Questions to Ask Employees about Your Environmental Policy Include:

- Can you describe the environmental policy in your own words?
- What does the environmental policy mean to you?
- How does your job contribute to your organization achieving the goals of the environmental policy?

The policy also needs to be **communicated externally** and made available to the public. Some options for external communications include placing your policy on business cards, in newspaper advertisements, in annual reports, and posting it on your organization's public Internet site.

Step 6) Review Your Environmental Policy for Effectiveness

Once your policy is in place, consider how you will demonstrate that your organization is implementing the commitments you laid out in the policy. This is a good test of whether or not the policy is a "living," working document and not just a hard copy document that will collect dust.

Review your policy during EMS Management Reviews (See the Management Review section later in this Handbook). These meetings are times when management, the EMR and other staff can determine whether the EMS is functioning consistent with your policy commitments, and that your environmental goals are being met.

Have your Environmental Policy readily available to the public. Provide the front office with copies of the policy so they can hand it out to inquirers. Also consider posting it on your Internet and at the local library and/or local public offices.

James Naber
Buncombe County, North Carolina
Metropolitan Sewer District

Development of our Environmental Policy enhanced Senior Management's ability to have open dialogue and constructed a message that coincided across the entire Metropolitan Wastewater District's mission.

Chris Toth
City of San Diego
Wastewater Collection Division

Environmental Policy

(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- Ensure that your organization's management establishes an environmental policy that defines your wastewater facility's environmental vision and goals, and that the policy is communicated and understood by all employees and applicable contractors and vendors.

The **Results** of this EMS element are:
- An approved environmental policy (EMS Document) that is implemented and understood throughout your organization.
- Firm management commitment to EMS implementation.
- Communication of the environmental policy throughout your wastewater organization, and its availability to the public.

Before you Begin this EMS element:
- Determine where your EMS will be applied ("fenceline").
- Consider defining your organization's impact on the environment and setting your environmental goals before finalizing your environmental policy.

ISO 14001 Requirements	Key Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Environmental Policy Top management shall define the organization's environmental policy and ensure that it: a) Is appropriate to the nature, scale and environmental impacts of its activities, products or services; b) Includes a commitment to continual improvement and prevention of pollution; c) Includes a commitment to comply with relevant environmental legislation and regulations, and with other requirements to which the organization subscribes; d) Provides the framework for setting and reviewing environmental objectives and targets; e) Is documented, implemented, maintained, and communicated to all employees; f) Is available to the public.	**Environmental Aspects -** Conduct your aspect/impact analysis to determine environmental management priorities in order to finalize your environmental policy. **Objectives & Targets -** Consider **s**etting goals before you finalize your environmental policy. This will set the framework and vision for environmental improvement. **Training & Awareness -** Every employee within the EMS fenceline needs to understand the basics and purpose of the EMS and the environmental policy, especially as it relates to their job. **Communication -** Communicate the environmental policy throughout your organization and make it available to the public. **Management Review -** Regularly review the effectiveness of the policy with top management.	A Documented Environmental Policy	Other Environmental Commitments (e.g., EPA's Green Lights, etc.) City/County Environmental Policies Business/Technical Objectives

Commissioners of Public Works

4.2 - Environmental Management System - Environmental Policy Statement

The Charleston Commissioners of Public Works (CPW) is committed to the improvement of the environment for present and future generations through:

- The treatment and delivery of safe potable water.
- The collection, treatment, and proper disposal of wastewater.
- The responsible impact of its activities, products and services on the environment.
- The continual environmental improvement and the prevention of pollution.
- Compliance with all applicable federal, state, and local laws, regulations, statutes and other environmentally related requirements to which the organization subscribes.
- The establishment of environmental objectives and targets that are peri odically reviewed to ensure success.
- And communication of its Environmental Management System to CPW associates and to other interested parties.

CPW will establish and maintain an Environmental Management System (EMS) that corresponds to the ISO 14001 Standard and the mission, vision, strategic business plan and core values adopted by CPW.

_____

William Koopman, Jr.,
General Manager

_____

Kin Hill, PE,
Director of Operations

_____

John Cook, PE,
Assistant General Manger

_____

Dorothy G. Harrison,
Director of Administrative Services

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Section 3: Legal and Other Requirements

Due to its potential impacts on the environment and public health, wastewater utilities are heavily regulated. A key requirement of the EMS and your environmental policy is a commitment to legal (regulatory) and other compliance requirements. To fulfill those commitments, you need to be up-to-date on the local, state, and federal requirements that apply to your operations, activities and services as well as any other relevant requirements. How these regulations and other commitments affect what you can do within your organization is a critical part of managing your environmental issues. Additionally, you'll want to verify that these requirements are communicated to employees whose work function is governed by these regulations in language that they can understand.

LEGAL Requirements Typically Include:

- *Federal requirements*
  (e.g., Emergency Release Notification—EPCRA; Clean Water Act—CWA; Spill Prevention, Control and Countermeasure, SPCC Rule, etc.)

- *State and local requirements*
  (e.g., Coastal Zone Management; Resource Conservation and Recovery Act—RCRA; Pretreatment Requirements; Biosolids Land Application)

OTHER Requirements Might Include:

- *Trade Association commitments or agreements*
  (e.g., American Water Works Association Standards, National Biosolids Partnership Code of Good Practice, APWA Management Accreditation Guidelines)

- *Local/regional environmental and community initiatives*
  (e.g., Regional Stormwater Education Partnership)

- *Voluntarily programs in which your organization participates*
  (e.g., EPA's Performance Track, Energy Star)

Step-by-Step Guide to Legal and Other Requirements

Step 1) Identify and Maintain Compliance with Your Legal and Other Requirements
Step 2) Develop a System Procedure for Identifying Your Legal and Other Requirements
Step 3) Check the Legal and Other Requirements Procedure for EMS Conformance
Step 4) Communicate Your Legal and Other Requirements

Key Section Terms
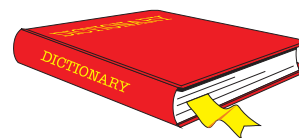
EMS Fenceline – Project scope and/or operational areas within an organization in which the EMS is implemented.

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 (e.g., industry standards or voluntary guidelines). Under an EMS, these requirements require the same commitment as legally binding requirements.

System Procedure – An EMS (ISO 14001) required document that establishes purpose, scope, roles & responsibilities, the tasks to be completed, and where and how the associated records and documents are maintained.

REMEMBER

A commitment to compliance with legal requirements is one of the three commitments of your environmental policy.

Step 1) Identify and Maintain Your Legal and Other Requirements

A good place to start is to review how your organization currently identifies and maintains its legal and other requirements. Ask yourself:

- Who on your staff is responsible for this? Perhaps you outsource it.
- What information sources do you find most useful and user-friendly?
- If outsourcing, you need to be confident that regulatory updates and requirements are updated and current.
- Where do you store the information and in what form?
- Is there an electronic database of your laws and other requirements? Perhaps it's a paper copy?
- Do your employees know how to access the information as necessary?
- How often do you check to see whether information is current?
- Who on your staff is responsible for communicating legal and other requirements clearly and simply to employees?

Case Study

In King County, Washington, the EMS Team surveyed their EMS fenceline (Solid Waste Operations) to identify their current regulations and permits that affect that area. King County started by putting together a list of the environmental regulations and then creating one clear, manageable reference document and list. The EMS Team identified the current and outdated regulations during the review.

Perhaps your current system is working well and your review confirms that your process is complete, current and efficient. Most importantly, you have verified roles and responsibilities, including communicating information to employees whose work is governed by the requirements.

In either case, once you've identified any gaps between what the EMS requires and what you currently do, you and your Core Team can plan ways to implement any necessary changes to make your process for determining legal and other requirements conform to the EMS requirements.

> "During our EMS development process we hired an external consultant to conduct an environmental requirements baseline which included an assessment of facility operations to determine which rules and regulations and other relevant industry standards applied to our wastewater facilities.
>
> Donna Adams
> Eugene, Oregon
> Wastewater Division

REMEMBER

You may find that an informal process for identifying and tracking information on your legal and other requirements exists already. Now it is simply a matter of developing a formal procedure.

Sources for Legal and Other Requirements

There are many sources of information to identify and track your environmental regulations and other requirements, including: federal, state, and local regulatory agencies; trade groups/associations; environmental journals; consultants; and commercial services (e.g., legal reports on CD-ROM). Identify the sources that suit your needs and incorporate them into your legal and other requirements procedure.

Many wastewater facilities have found it useful to collect a common list of information sources and key contacts and to post this list in their EMS documents. In many cases this activity has brought some duplication of effort and inefficiencies to light and expedited the process of staying current with legal requirements.

One legal information source that many wastewater and public organizations have found very useful is the Local Government Environmental Assistance Network (LGEAN), which provides environmental management, planning, funding, and regulatory information for local governments. LGEAN enables local officials to interact with their peers and others online.

The International City/County Management Association (ICMA) is responsible for the management of LGEAN, but the strength of the LGEAN network is in the partnership that has been formed by the various organizations that comprise it, including trade associations, regional and state non-profits such as the Environmental Council of the States (ECOS), and government agencies, such as the U.S. EPA. Through the membership of these partners, the network is able to reach more than 100,000 local government officials and environmental professionals.

NOTE

Many organizations use a consultant to do a compliance status check of the entire fenceline. At the same time the consultant can help develop a list or database of the local, state, and federal laws that apply to your facility.

Legal Sources

Wastewater facilities that were consulted for this Handbook considered the following sources of regulatory and other requirements information the most important and useful:

1) EPA Website (www.epa.gov)

2) Local Government Environmental Assistance Network (www.lgean.org)

3) Federal Register Notices

4) Trade Associations (e.g., The Association of Metropolitan Sewerage Agencies (AMSA), Water Environment Federation (WEF), National Rural Water Association (NRWA), etc.)

5) State Agency Internet sites and Information Sources

Involving Contractors and Temporary Staff

It is important to train and communicate legal and other requirements to your temporary employees if they work in areas that are regulated, have significant aspects, or are related to your objectives and targets.

Remember to communicate and provide training in language they can understand. For example, for temporary staff for whom English is not their primary language, consider using illustrations (e.g., a circle with a line through it to indicate no). For example you could create a sign to designate for employees to not throw their oily rags in the general trash.

If on-site contractors are within your EMS fenceline, they also need to understand their responsibilities to comply with environmental, legal, and organizational requirements.
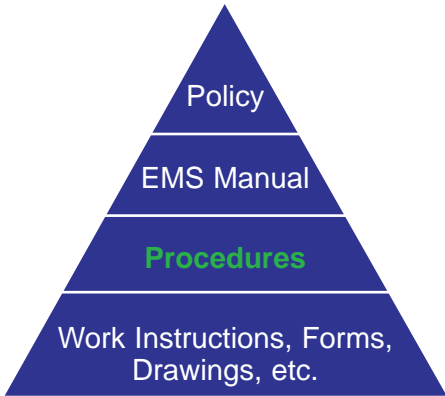
A Legal and Other Requirements **system procedure** is required for this element. A system procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed.

The Association of Metropolitan Sewerage Agencies (AMSA), is another great legal resource for wastewater organizations. AMSA represents public wastewater agencies and organizations and and works closely with federal regulatory agencies in the implementation of environmental programs.

Resources that wastewater facilities have used to identify and track environmental laws and regulations can be found in Appendix C. Also, see pages 3-68 through 3-97 in EPA's "Profile of Local Government Operations," for a list of relevant Federal environmental regulations for wastewater operations.

Step 2) Develop a System Procedure for Identifying Your Legal and Other Requirements

When you're satisfied that your process for determining legal and other requirements conforms to the EMS requirements, it's time to document the process in a system procedure. Your system procedure clearly defines what you'll do, roles and responsibilities, when you'll do it, how the information will be communicated, and where the information will be stored. This documented procedure should be a consistent, easily accessible, and clear guide for ensuring that this important element of your EMS is carried out according to plans.

For samples of Legal and Other Requirements procedures from wastewater facilities, see Appendix A.

Step 3) Check the Legal and Other Requirements Procedure for EMS Conformance

About two or three months after you have documented and implemented your Legal and Other Requirements procedure it's time to check to see if it's actually working according to the plan. Here are some questions to ask yourself and the organization:

Check ✓
1. Is there a list of all applicable legal and other requirements (your record that you have implemented the procedure)?
2. Can employees who need the information access it easily?
3. When is the next review date?
4. Have the requirements been communicated and understood by the employees and contractors that need to know?
5. Can employees whose work is governed by legal and other requirements describe how the law affects what they do in their daily jobs?

For an Evaluation Checklist example see Appendix B.

Step 4) Communicate Your Legal and Other Requirements

Identifying your legal and other requirements is an important first step. But what good is the information if it's not communicated to employees, on-site contractors, and others who need to understand it?

It's important that employees whose work is affected by these laws understand what the requirements mean, and how they affect their job. Communication about your legal and other requirements should be in plain English rather than "legalese."

▶ NO!—According to the Clean Water Act, section 5.3.3 and our Stormwater Management Plan, it is illegal to dump hazardous waste in anything other than its proper, labeled container.

▶ YES! —We should not dump our hazardous waste in the floor drain because the drain leads to the local stream where we like to fish.

REMEMBER

Not everyone in every area needs to know all the legal requirements that apply to your organization. Keep in mind that different people may have different informational needs.

Three Lessons Learned

(from wastewater facilities):

1. Include clearly-defined roles and responsibilities in your methods to track requirements.

2. Consider using a third-party to document your baseline of legal requirements.

3. Conduct more frequent reviews of your legal requirements than other EMS elements. The wastewater industry is heavily regulated and changes can occur often.

Three Things to Avoid

(from wastewater facilities):

1. Making your legal and other requirements review a one-time only activity. You must keep up-to-date with with changing requirements.

2. Overlooking the communication of applicable requirements to front-line floor employees.

3. Treating "other" requirements and voluntary initiatives as "minor" agreements.

Legal and Other Requirements

(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- ❏ Identify, track, and communicate your organization's legal and other requirements.

The **Results** of this EMS element are:
- ❏ A system procedure (EMS document) that identifies, tracks, and communicates your Legal and Other Requirements.
- ❏ A list (EMS record) of applicable environmental laws and other requirements.

Before you Begin this EMS element:

- ❏ Identify environmental regulatory information relevant to your organization.
- ❏ Obtain information regarding other environmental requirements relevant to your organization.

ISO 14001 Requirements	Key Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Legal and Other Requirements The organization shall establish and maintain a procedure to identify and have access to legal and other requirements to which the organization subscribes and that are applicable to the environmental aspects of its activities, products or services.	**Environmental Policy -** Your policy requires commitment to all applicable environmental laws and organizational requirements. Compliance with environmental laws is one of the three major policy commitments. **Objectives & Targets -** Consider your legal commitments and requirements as you identify possible areas for measurable environmental performance improvements. **Training & Awareness -** Employees whose work is governed by regulations need to understand the laws that affect their daily work and the operational controls that are needed to maintain compliance. **Communication** - Talk to employees about how environmental laws and other requirements affect their work, and how their roles and responsibilities ensure compliance. **Operational Control** - Procedures, work instructions, manuals, etc. need to be documented or established for environmental priority areas and regulated areas.	Legal and Other Requirements Procedure List of Legal and Other Requirements	Compliance Plans Relevant Code of Federal Regulations (CFRs), State and Local Regulations, Permits, etc.

Section 3: Environmental Aspects and Impacts

(Defining the Impact Your Organization Has on the Environment)

Identifying how your organization's operations and services affect the environment is a critical element of your EMS. It is here that you will begin the first step of defining your organization's environmental "footprint" (i.e., how your operations and services affect the environment), leading to measurable goals for improving your environmental performance through your EMS.

The step-by-step tasks described in the following sections will guide your organization in identifying its environmental footprint. This process is one of the most challenging portions of EMS implementation and requires focus and teamwork. However, this is the opportunity for your organization to stop, take a hard look at your individual operations and activities, and identify how these positively and negatively affect the environment.

You are about to embark on a process of organizational "discovery" that will help everyone involved better understand your operations and the unique role that each of you, individually and collectively, play in managing your wastewater facility's environmental impacts. The result of this effort will be a list of environmental aspects and impacts, and the processes/activities that potentially create them. From this list, your team will develop a means to prioritize those that are most significant and those that require your organization's most immediate attention. This may seem daunting, but if you follow the step-by-step approach it will be manageable and you will quickly realize the benefits of this effort.

Step-by-Step Guide to Identify and Prioritize Environmental Aspects

Step 1) Clarify EMS Jargon with Your Team
Step 2) Determine Your Core Operations and Supporting Activities—Your EMS "Fenceline"
Step 3) Construct Input/Process/Output Diagrams
Step 4) Develop a List or Matrix of Environmental Aspects and Impacts
Step 5) Prioritize Your Environmental Aspects and Impacts
     a. What Criteria will you Use to Prioritize?
     b. How Will the Criteria be Used?
Step 6) Develop a System Procedure for Identifying Your Environmental Aspects/Impacts
Step 7) Check Your Environmental Aspect Identification Procedure for EMS Conformance
Step 8) Review and Revise Your Environmental Aspects/Impacts

Key Section Terms

EMS Core Team – A cross-functional team made up of individuals within the organization that helps facilitate EMS implementation across the organization. Team members are the EMS experts and cheerleaders.

Environment – Surroundings in which an organization or facility operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation.

Environmental Aspect – Element of an organization's activities, products or services that can interact with the environment. Aspects = Causes

Environmental Impact – Any change to the environment, whether adverse or beneficial, that results from an organization's activities, products or services. Impacts = Effects

EMS Fenceline – Project scope and/or operational areas in an organization in which the EMS is implemented. For example, for wastewater operations, this could include the pretreatment and the laboratory operations.

"Footprint" – The environmental impact of your facility; how your operations and services interact with the air, water, land, resources, local and regional community, etc.

Stakeholders – Groups and organizations having an interest or stake in an organization's EMS (e.g., regulators, shareholders, customers, suppliers, special interest groups, residents, etc.).

It's a good idea to be sure you have a clear understanding of the difference between activities, aspects, and impacts. Here's a short quiz to use with your EMS Core Team (the answers are below). Indicate which of the following terms is an activity, aspect, impact, or none?

Aspect, Impact, Activity, or None

1) Air pollution/degradation
2) Burning diesel fuel
3) Digester
4) (Electrical) energy consumption
5) Water consumption
6) Degradation of a stream/creek
7) Burning bio-diesel fuel
8) Spilled Solvent
9) Recycling Program
10) Cleaning Spills

Answers:
1) Impact 2) Aspect – driving the truck is the activity 3) None 4) Aspect 5) Aspect 6) Impact 7) Aspect 8) Aspect – spill is an aspect; worker contamination and degradation to water/soil an impact 9) Activity 10) Activity

Before we jump directly into the next steps, the aspect/impact analysis presents a terrific opportunity for you to involve not only the Core Team, but also your front-line employees. In fact, their participation is often referred to as a fundamental key to successful EMS implementation. These are the employees who have hands-on knowledge and experience of all of the activities you are preparing to evaluate and who are the closest to the actual operations. Their involvement will also help instill an understanding and appreciation for the interaction between the environment and their daily work activities. Involve them early, because it will reap wonderful rewards throughout implementation. Talk about getting buy-in for your EMS!

Step 1) Clarify EMS Jargon with Your Team

One of the first hurdles that you will likely encounter is having your Team(s) achieve a comfort level with the EMS "jargon" involved in this phase of activities. Therefore, take a look at two terms that you or your employees may not have seen before—aspect and impact. Environmental aspects are the parts of your operations and activities that interact with the environment. Environmental impacts are the changes to the environment, positive or negative, resulting from your organization's operations and activities. Still a little unclear?

Well, try thinking about it this way: the aspects are the causes and the impacts are the effects.

Aspects = Causes   and   Impacts = Effects

For example, the burning of gasoline in your car can <u>cause</u> air emissions which <u>affect</u> the air quality.

Here are some examples from wastewater facilities:

Operation or Service Activity	Environmental Aspects	Potential Environmental Impacts (Effects)
Burning of Fuels	Air Emissions (CO)	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
Equipment Maintenance	Solid Waste Generation	Reduction in Landfill Space
Facility Boilers	Electricity Use (Gas & Diesel)	Reduction in Natural Resources
Office/Administrative Activities	Recycled Paper	Conservation of Landfill Space

Why is this distinction so important? In order for your organization to build and grow a culture of continual improvement with regard to the environment, you first need to identify how your organization affects or impacts its surrounding environment. To ultimately manage the identified

impacts, you also need to identify the operations and/or activities that cause the impacts and the ways these occur. The more clearly your team can define this relationship, the better able they will be to understand what needs to be done to control and manage the most important impacts.

Step 2) Determine Your Core Operations and Supporting Activities—Your EMS "Fenceline"

Once your team has a solid understanding of the terms "aspect" and "impact," work with your EMS Team(s) and management to define exactly what operations and supporting activities will be the initial focus of your EMS efforts. This area or operation is commonly referred to as the EMS "fenceline." An EMS can be applied to any operation or activity within your wastewater facility, big or small—a department, division, operation or your entire facility. Remember, this is YOUR EMS and only you can decide what makes sense for your organization.

Other wastewater facilities and local organizations that have implemented EMSs advise: Think Big, Start Small! It may be tempting at first to include all of your operations and facilities within your EMS fenceline, but it is usually unrealistic for most organizations to launch and manage such a large-scale project, considering the human and financial resources involved. Consider starting with a small section of your organization, and then add more departments and facilities as your EMS experience and expertise grows. This way you develop a solid understanding of the EMS process and a group of internal experts that can act as mentors as your EMS grows.

Example Fencelines from Wastewater and Public Organizations that have Implemented EMSs:

Louisville and Jefferson County, KY Metropolitan Sewer District	Wastewater Treatment Facility and Purchasing Department
Oakland County, MI Drain Commissioner's Office	Wastewater Treatment Plant— Engineering and Construction
Rivanna, VA Water and Sewer Authority Complex	Wastewater Treatment Plant
Kent County, DE Department of Public Works	Wastewater Treatment Facility and Biosolids Operation
City of Eugene, Oregon	Wastewater Division
Charleston, South Carolina	Entire Wastewater Operation
San Diego, California	Wastewater O&M Division

Three Lessons Learned
(from wastewater facilities):

1. Ensure the activities you list for your 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).

2. Make your aspect ranking method simple and easy to understand.

3. Keep your aspect analysis procedure flexible—remember, this process is not set in stone—if you do not feel your aspect analysis is working, change it! Remember, an EMS is about continual improvement.

Questions to Consider:

▶ What resources do you have at your disposal for EMS activities?

▶ Where will you get the most bang for your buck? What areas give you the most heartburn at the moment or are of greatest concern to your community?

▶ Where do you use the most natural resources? Energy? Hazardous materials?

▶ What areas have the most support and/or interest? Have receptive management? Line supervisors? Employees?

Inputs/Process/Outputs Overview

One way to visualize the environmental "footprint" of your operations and activities is to construct input/process/output diagrams. These diagrams will help you identify what materials and resources you use (inputs), where they are used (the process), and how they are turned into a product or service (output), re-used as by-products (output), or become wastes (output). A simple input/process/output diagram is provided below. As you will see in this section, these diagrams are helpful in identifying your environmental aspects.

Materials & Resources (Inputs)

↓

Wastewater Pretreatment (Process)

↓

Products, By-products, and Wastes (Outputs)
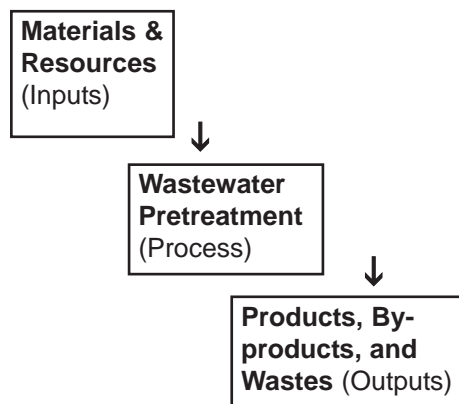
Step 3) Construct Input/Output Diagrams

Once you have defined which operations and activities fall within your EMS implementation scope, take a closer look inside your fenceline. To understand your environmental aspects and impacts, it helps to understand the inputs/processes/outputs that are part of the operations and activities within your fenceline. At this point you may be thinking, "okay I can do that, let's sit down and drum up a list. We pretty much know our impacts on the environment." Although your team could probably brainstorm a pretty good list, the EMS process helps you focus your efforts to ensure that you cover all bases and that nothing slips through the cracks.

One common approach for conducting this assessment is to first create a flowchart of your EMS fenceline with associated processes and operations.

A typical wastewater facility-level diagram is presented below as an example of the common format:

For example purposes, let's say that your organization selected "Treatment" as its EMS fenceline. Based upon the above example you would then dig a little deeper to look at the individual operations/activities within this fenceline. To accomplish this, organizations commonly utilize input/process/output diagrams (see sidebar) to help understand and visualize processes as well as how materials are used, re-used and disposed within each individual operation or activity. You are probably wondering why "Laboratory" is highlighted a little differently than the other operations/activities in the diagram above. The next few pages will walk through the basics of determining environmental impact for a laboratory operation.

The next step is to construct the input/process/output diagrams for each of the operations/activities within your fenceline and laboratory as selected in the sample diagram.

Materials & Resources� (Inputs)
Effluent
Biosolids
Lab Equipment
Chemicals
Gases
Microbiological Media
Energy
Supplies

Laboratory (Process)
- Chemical Analysis
- Biological Analysis
- Physical Analysis
- Monitoring
- Sampling
- Generation of Data

↓

Wastes (Outputs)
Analysis (Chemical) Wastes
Glassware
Solid Waste (e.g. Trash, Empty Containers, etc.)

Products� (Outputs)
Laboratory Data

By Products� (Outputs)
Recyclables (e.g. Glassware, Packaging, Paper, etc.)

This process for developing input/process/output diagrams should now be continued for each of the other operations/activities within your defined fenceline. For example, if your EMS Team were working from the example flowchart presented above, you would proceed to develop diagrams for Chemical Storage/Haz Materials Management, Biosolids Management and Disposal, Pretreatment Program Compliance, and NPDES Permit Compliance. Remember, this is only an example. Your defined fenceline might entail very different operations/activities both in number and type.

> *By focusing on the creation of input/process/output diagrams first in the determination of our impacts and aspects, we were able to see the environmental consequences of our organization.*
>
> San Diego, California
> Refuse Disposal Division

REMEMBER

Keep in mind as you brainstorm and generate your aspect/impact list that you are not expected to manage environmental issues outside your influence or control. For example, while your organization probably has control over how much electricity it buys from a supplier, it likely does not control or influence the way in which that electricity is generated. Therefore, your focus as you develop your list should be on the environmental aspects of your own operations and services within the fenceline that you define.

COACH'S CORNER

Your EMS Site Team(s) are terrific at producing input/process/output diagrams in the areas in which they work. Along with the Site Team member(s), have a Core Team member and a person from your environmental staff when you develop your diagrams. This is a great opportunity for operational and environmental staff to discuss your facility and processes, perhaps for the first time.

When you identify your aspects and their impacts, you want to identify:

1) Regulated Aspects (e.g., Air Emissions, Water Discharges, etc.)

2) Non-Regulated Aspects (e.g., Electrical/Energy Use, Land Use, etc.)

3) Emergency Situations/ Conditions (e.g., Spills, Leaks, etc.)

4) Positive Impacts on the Environment (e.g., Recycling Paper, Re-Use of Water, Using Biogas as an Energy Source, etc.)

Don't beat your aspect analysis to death—do the evaluation the best you can and move on. It is very easy to get bogged down in this element and not make any progress. Don't be afraid to say, 'good enough for now, let's move on.'

Beth Eckert
Gastonia, North Carolina
Public Works and Utilities Department

Step 4) Develop a List or Matrix of Environmental Aspects and Impacts

Once you have identified your core fenceline operations and activities and created diagrams to "visualize" your processes, it's time to create your list of environmental aspects and impacts. Get together with the employees from the areas where you have input/process/output diagrams to brainstorm and work together on your wastewater environmental aspect/impact list. Start with each process. For instance, look at the example diagram and text on the previous page and take a closer look at chemical analysis, then biological analysis, followed by physical analysis and so on.

The most common approach to developing this list of environmental aspects and impacts is to develop a matrix for each of your input/process/output areas to collect relevant information in an organized and manageable manner.

Referring back to the laboratory example, the first step is to add the various processes involved in laboratory operations/activities. The following is an example for the laboratory:

Operation/Activity
Chemical (Nutrient) Analysis
Biological Analysis
Physical Analysis
Sampling, Analysis & Monitoring
Laboratory/Biosolids Testing
Laboratory/Recycling Program

Next, add the various aspects related to each individual process. Remember, aspects are how these processes interact with the environment and are the causes of potential environmental impacts. Adding some aspects, the example matrix would now look like this:

Operation/Activity	Aspects
Chemical (Nutrient) Analysis	Hazardous Waste Disposal
Biological Analysis	Spills, Solid Wastes, Hazardous Waste
Physical Analysis	Solid Wastes
Sampling, Analysis & Monitoring	Energy Use
Laboratory/Biosolids Testing	Energy Use, Solid Wastes, Hazardous Waste
Laboratory/Recycling Program	Glassware Recycling (+)

Okay, at this point you have brainstormed with your team and with the help of your visual diagrams. You've identified the various processes involved and their associated aspects. Now, let's add the potential impacts to the environment of each process. Doing so would look like:

Operation/Activity	Aspects	Impacts
Chemical (Nutrient) Analysis	Hazardous Waste Disposal	Potential Land and Water Degradation, Landfill Use
Biological Analysis	Spills, Solid Wastes, Hazardous Waste	Depletion of Natural Resources, Landfill Use, Hazardous Waste Disposal
Physical Analysis	Solid Wastes	Landfill Use
Sampling, Analysis & Monitoring	Energy Use	Depletion of a Natural Resource
Laboratory/Biosolids Testing	Energy Use, Solid Wastes, Hazardous Waste	Depletion of Natural Resource, Landfill Use, Hazardous Waste Disposal
Laboratory/Recycling Program	Glassware Recycling (+) - see sidebar on positive aspects	Conserving Landfill Space (+) - see sidebar on positive aspects

Sample lists of aspects and impacts from wastewater facilities are provided in Appendix A.

NOTE

As a public organization, you may want to consider involving external stakeholders (neighbors, local community groups, etc.) in identifying potential environmental aspects and impacts that affect the local community. For example, you may want to consider effluent, odor, and light pollution issues.

Step 5) Prioritize Your Environmental Aspects and Impacts

Whew! At this point you probably have a large list or a number of individual operation/activity lists of environmental aspects and impacts. Don't worry! An EMS is structured so that you do not have to manage all of these aspects and impacts at once. The next step of the process is to whittle the list down, through a prioritization technique, to a manageable group of the most "significant" to your organization. So, how do you narrow your list to focus on what is most significant? First you need to develop a means to rank and differentiate, or "prioritize," the different aspects that you have identified, to determine which of them are most significant.

COACH'S CORNER

Involving personnel from the frontline in identifying your inputs/ processes/outputs and your aspects/impacts list is a good way to ensure buy-in to your 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).

"Don't get too far down in the weeds"

Many wastewater facilities have reported getting caught up in too much detail and generating very large lists of environmental aspects and impacts. Remember that this is an iterative process—a process that stresses the importance of **continuous improvement**. If you do not catch every aspect/impact during your first review, it's okay. You will most likely catch it during the next cycle as your EMS is refined and matures.

NOTE

When you prioritize the environmental impacts at your facility, consider what is regulated as one of your key scoring criteria.

Significant criteria to consider when prioritizing your environmental aspects:

⇨ Impact to Natural Resources
⇨ Impacts to Land, Water and Air
⇨ Cost
⇨ Probability of Occurrence
⇨ Volume
⇨ Toxicity
⇨ Regulated
⇨ Public (Stakeholder) Impact
⇨ Nuisance
⇨ Human Health Impacts

The basic process that you will use is to (1) define a group of selection criteria (e.g., air, water, land), (2) develop a scoring system, and (3) apply this criteria to each of the listed environmental aspects to achieve a total rank or number. For example, looking at the laboratory, the scores come out as follows:

Operation/ Activity	Aspects	Impacts	Changes to Air	Changes to Land	Changes to Water
Chemical (Nutrient) Analysis	Hazardous Waste Disposal	Hazardous Waste Disposal	3	5	5
Biological Analysis	Spills, Solid Wastes, Hazardous Waste	Depletion of Natural Resources, Use of Landfill Space, Hazardous Waste Disposal	1	1	3
Physical Analysis	Solid Wastes	Use of Landfill Space	1	5	3
Sampling, Analysis & Monitoring	Energy Use	Depletion of a Natural Resource	1	1	1
Laboratory/ Biosolids Testing	Energy Use, Solid Wastes, Hazardous Waste	Depletion of Natural Resource, Use of Landfill Space, Hazardous Waste Disposal	1	3	1
Laboratory/ Recycling Program	Glassware Recycling (+)	Conserving Landfill Space (+)	1	3+	1

Step 5a) What Criteria will you Use to Prioritize?

As with every other part of the EMS, the Keep It Simple, Simple [KISS] rule applies here. Experience has shown that a simple system for prioritizing environmental aspects and impacts has generated the same results as a more complex one, but in a shorter period of time and with happier EMS team members. There is not a magic number here in terms of how many criteria you will utilize; it really depends on what factors are important within your organization and what allows your organization to simply and effectively rank your identified aspects. The criteria you use to determine significance will act as a filter to identify those environmental aspects that your organization will need to manage. Here's some simple advice: Don't have too many criteria. A very complicated grading system will confuse and discourage those involved and make this process much more difficult than necessary. Remember the KISS rule!

Step 5b) How Will the Criteria be Used?

Once you have selected your criteria for ranking your aspects and impacts, apply the criteria to each of the entries on your aspects & impacts list using a quantitative ranking method. A simple 1 – low; 3 – medium; and 5 – high impact rating system works well and avoids long discussions about the difference between a 2 and 3 or a 3 and 4.

However, if your team can't seem to decide if something should be a 3 or a 5, call it a 4 and move on! **Don't let the pursuit of the perfect become the enemy of the good!**

Refer back to the laboratory example, suppose that our teams selects the following three criteria for prioritizing aspects: Impact to Air, Land, and Water.

Adding the criteria into our example table and applying our simplified scoring system, your team would end up with something like this:

Operation/ Activity	Aspects	Impacts	Air Impact	Land Impact	Water Impact	Total Score
Chemical (Nutrient) Analysis	Hazardous Waste Disposal	Hazardous Waste Disposal	3	5	5	13
Physical Analysis	Solid Wastes	Use of Landfill Space	1	5	3	9
Biological Analysis	Spills, Solid Wastes, Hazardous Waste	Depletion of Natural Resources, Use of Landfill Space, Hazardous Waste Disposal	1	1	3	5
Laboratory/ Biosolids Testing	Energy Use, Solid Wastes, Hazardous Waste	Depletion of Natural Resource, Use of Landfill Space, Hazardous Waste Disposal	1	3	1	5
Laboratory/ Recycling Program	Glassware Recycling (+)	Conserving Landfill Space (+)	1	3+	1	5
Sampling, Analysis & Monitoring	Energy Use	Depletion of a Natural Resource	1	1	1	3

Involving Contractors and Temporary Staff

It is important to involve contractors and temporary employees in this phase of your EMS, particularly if they work in areas that can create a significant impact on the environment. The wastewater facilities that have EMSs in place that contributed to this Handbook involve them in the aspects/impacts analysis, as well as in the setting of objectives and targets if they work in areas that could have an environmental impact.

Three Things to Avoid
(from wastewater facilities):

1. 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.

2. Making your significance threshold too low and thereby taking on too many significant aspects. Remember that for every significant aspect you name, you must have an operational control (i.e., procedures, manuals, work instructions, etc.) in place.

3. Getting bogged down when discussing applicable scores for an environmental aspect. Come to a consensus and move on.

To reinforce what we just learned, let's look at another wastewater example, this time looking at the environmental aspects/impacts from the collection and distribution of wastewater via a sanitary sewer system.

The activities, aspects, and impacts of operating and maintaining a wastewater sanitary sewer system could include:

Operation/Activity	Aspect	Impact
Repairing/Maintaining Manholes	Use of Oils and Lubricants	• Depletion of a Natural Resource • Contamination of Water/Land
Repair Leaking Sewer Lines	Energy Use	• Depletion of a Natural Resource • Employee H&S
Operate & Maintain Pump Stations	Sewer System Overflows (SSOs) – i.e., spills	• Degradation of Water/Land (Streams, Creeks, Soil, etc.) • Impact to Public Health

Brainstorming with the sanitary sewer and environmental staff, the EMS Core Team scores the sewer system overflow/sewage backup aspect for significance. Note that the criteria that scored the highest (land and water impact and health & safety), match the impact areas that came from your aspect/impact list.

Operation/Activity	Aspect	Impact	Land Impact	Air Impact	Water Impact	Health & Safety	Total Score
Operate & Maintain Pump Stations	Sewer System Overflows (SSOs)	• Degradation of Water/Land (Streams, Creeks, Soil, etc.) • Impact to Public Health	5	1	5	5	16

So, you came up with a total score of 16 for this aspect. But what does this score mean? Once you've determined all your aspects and their associated impact scores for the operations/activities within your defined fenceline, you will need to establish a threshold for significance based on what your organization can reasonably manage (for instance anything over 15 could be considered significant in this last example).

Keep in mind that each organization has the flexibility, based on its business, technical, legal, operational, and interested party concerns and requirements, to set what it considers to be a significant threshold value. As mentioned previously, make sure that everyone realizes that each aspect that is identified as significant (i.e., a total score over your determined threshold) will require some kind of operational or

equipment control measure, training, recordkeeping and other relevant EMS required management practices to minimize or prevent the environmental impacts. Remember, this is a continuous process, so you don't need to save the world the first time around!

Now, compare how other aspects within the sanitary sewer operation and other wastewater operations scored against sewer system overflows. Conduct a reality check with the employees in sewer operations and maintenance and the environmental department to see if your environmental significance ranking makes sense. Did the aspects of your operations/activities that surfaced to the top make sense? If not, discuss this among your group and ensure that it wasn't a scoring error. Ensure that everyone understands how and why the aspects identified as significant became so and that they are committed to focusing on these areas in subsequent EMS tasks.

Step 6) Develop a System Procedure for Identifying Your Environmental Aspects/Impacts

When you're satisfied that your process for identifying and ranking your environmental aspects/impacts conforms to the EMS requirements, it's time to document the process in a written system procedure. Your system procedure clearly defines what you'll do, roles and responsibilities, when they'll do it, methods for communicating, and where the information will be stored. This documented procedure will be a consistent, easily accessible, and clear guide for ensuring that this important element of your EMS is carried out according to your plans.

For sample procedures on identifying environmental aspects from wastewater facilities, see Appendix A.

Step 7) Check Your Environmental Aspect Identification Procedure for EMS Conformance

Once you have your Environmental Aspect Identification Procedure in place, review it for EMS conformance.

Check ✓

1) Have you conducted a sound methodology?
2) Have you included all core fenceline operations and activities?
3) Have you developed a list of significant environmental aspects and impacts?
4) Is the aspect/impact list reviewed at least annually?
5) Does your procedure account for changes to operations and activities?

"Once your original aspect/impact list is developed and you have controls in place, you need to come up with a process to deal with change and a way to capture any new activities and aspects and score them for significance."

Donna Adams
Eugene, Oregon
Wastewater Division

An Environmental Aspect **system procedure** is required for this element. A system procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed for this element.

Step 8) Review and Revise Your Environmental Aspects/Impacts

Once you have your aspect list in place and you have determined your significant environmental issues at your wastewater facility, keep the information up-to-date. Using the written procedure you have developed, review your aspect list at least once a year and complete an aspect/impact review when you have any new or changed operations or services coming on-line.

Environmental Aspects and Impacts

(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- ❍   Identify and rank the environmental aspects and impacts of your wastewater facility.

The **Results** of this EMS element are:
- ❍   A list/table (EMS record) of the activities, environmental aspects and environmental impacts of your wastewater facility.
- ❍   Significance criteria (EMS record) for ranking your priority environmental impacts.
- ❍   A system procedure (EMS document) for environmental aspect and impact identification and significance determination.

Before you Begin this EMS element:
- ❍   Draft your environmental policy.
- ❍   Complete your wastewater legal and other requirements procedure and requirements list.

ISO 14001 Requirements	Key Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Environmental Aspects The organization shall establish and maintain a procedure(s) to identify the environmental aspects of its activities, products or services that it can control and over which it can be expected to have an influence, to determine those which have or can have significant impacts on the environment. The organization shall ensure that the aspects related to these significant impacts are considered in setting its environmental objectives. The organization shall keep this information up-to-date.	**Objectives & Targets -** In setting your environmental goals, remember to consider the significant aspects of your operations and services. **Training & Awareness -** Employees working in significant aspect operation and service areas need to understand their responsibilities in these priority areas. **Communications -** Communicate your significant aspects throughout your fenceline. Also, make a decision on whether you will communicate your significant aspects to the public. **Operational Control -** Control and manage (through procedures, work instructions, manuals, etc.) all your significant aspects.	Aspect and Impact Analysis Procedure A List of Significant Criteria A List of Significant Environmental Aspects	Activity/Aspect/Impact List Input/Output Diagrams

Section 3: Objectives & Targets and Environmental Management Programs:
(Establishing Goals and Roadmaps for Achieving and Improving Environmental Management)
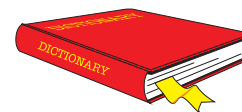
Now that you've identified and ranked your most important environmental aspects and impacts, it's time to set some goals for improving your organization's environmental management. Setting objectives and targets presents an opportunity to identify where you want to be in the next year or two regarding your significant aspects. Let's determine which of your significant aspects will have specific and measurable objectives and targets for improving your performance.

Remember, all significant aspects must be managed in accordance with the ISO 14001 requirements; however, your organization can select aspects to set objectives and targets. In doing so, consider your organizational goals, environmental policy, and your organizational abilities. If you are in a position to be enthusiastic and push performance, then do so and select challenging objectives and targets. On the other hand, there is no shame in taking a more conservative approach and choosing more practical objectives and targets. Just remember that the EMS is about continual performance improvement!

As mentioned earlier in this document, your EMS can also be strengthened by using other important utility management tools and programs. For example, a number of utilities, including some that contributed to this Handbook, are using the Balanced Scorecard approach to set performance measures for their organization. The Balanced Scorecard gives organizations a well-organized method of developing measures that deal with both environmental performance and customer needs. When setting your objectives and targets, you may wish to use the Balanced Scorecard approach to ensure they are responsive to a full range of needs.

Let's review a few basic terms:

Environmental Objective: The internal goal your 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 your objective. Example: Reduce sulfur dioxide, particulate matter, and carbon dioxide emissions 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. Examples include: measuring the emissions of sulfur dioxide, particulate matter, and carbon dioxide per year from established baselines in order to check the progress in meeting your target of 50% reduction from current levels. Performance indicators can be adjusted to meet specific management needs or as necessary to ensure progress toward reaching specific environmental targets.

Key Section Terms

Baseline – The starting point from which to track the achievement of an objective. Establish "normalized" baselines to accurately measure how your facility's environmental performance could change over time. Normalized baselines will measure your actual environmental performance changes rather than changes in production, customer demand, or other non-environmental related factors.

Environmental Aspect – Elements of an organization's activities, products or services that can interact with the environment. Aspects = Causes

Environmental Impact – Any change to the environment, whether adverse or beneficial, that results from an organization's activities, products or services. Impacts = Effects

Environmental Management Program (EMP) – A structured program with a set of specific identifiable actions (an "action plan") providing the direction for EMS objectives and targets to be obtained and tracked. Your EMP should assign tasks, resources, responsibilities, and timeframes for achieving your objectives and targets.

Environmental Objective – An overall environmental goal based on an established environmental policy, that an organization sets itself to achieve. Wherever possible, environmental objectives should be quantified, to facilitate the evaluation of environmental performance and the measurement of progress towards specific environmental targets.

Key Section Terms, continued

Environmental Target – A detailed performance requirement, quantified where practicable, that arises from the environmental objectives and that needs to be set and met for the objective to be achieved.

Stakeholders – Groups and organizations having an interest or stake in an organization's EMS (e.g., regulators, shareholders, customers, suppliers, special interest groups, residents, etc.).

COACH'S CORNER

Setting objectives and targets will help your organization translate environmental goals into measurable results. These goals can be factored into your organization's strategic plans and can facilitate the integration of environmental management into your quality, health and safety, and other management programs.

How many objectives and targets should your organization have? Wastewater facilities that have implemented EMSs recommend that it is best to start with a limited number of objectives (2 to 3) and then expand the number over time. Keep your objectives simple initially, achieve some early successes, and then build on them. As you gain experience in managing your objectives and targets, additional and potentially more robust objectives and targets can be set and added.

NOTE

Your organization has the flexibility to determine what environmental goals are appropriate based on your needs. Objectives and targets can be set organization-wide or within an operation (e.g., 20% energy reduction for your entire wastewater treatment operation versus 20% energy reduction for the biosolids operation).

NOTE

Although there are a lot of examples from wastewater facilities that have implemented EMSs, there are no "standard" environmental objectives and targets that make sense for all organizations. Your objectives and targets should reflect what your organization does, how well it is currently performing, and what it wants to achieve.

Step-by-Step Guide to Setting Objectives & Targets and Establishing EMPs

Step 1) Determine the Significant Aspects for which You'll Set Objectives & Targets
Step 2) Identify Your Objectives and Establish Target(s)
Step 3) Define the Performance Indicator(s) You'll Use to Measure Your Targets
Step 4) Establish Your Environmental Management Programs (EMPs) to meet the Objectives and Targets
    a. List the Individual Tasks Required to Meet Your Target
    b. Assign Responsibility
    c. Establish Deadlines for Individual Tasks
    d. Estimate Staff Time and Costs
Step 5) Get Top Management's Commitment and Approval
Step 6) Develop a Procedure for Setting Objectives & Targets and Establishing EMPs
Step 7) Check Your Objectives & Targets and EMPs for EMS Conformance
Step 8) Communicate Your Objectives & Targets and EMPs
Step 9) Review and Revise Your Objectives & Targets and EMPs

Step 1) Determine the Significant Aspects for which You'll Set Objectives and Targets

Previously it was mentioned that you do not have to set objectives and targets for every significant aspect, so how does your organization decide which to select? Look back at your list of ranked significant aspects and determine which aspects you want to establish performance improvement goals based on your: 1) legal and other requirements; 2) the views of interested parties (e.g., internal and external stakeholders); 3) technical options; and 4) financial, operational, and other organizational realities.

COACH'S CORNER

Be flexible in setting your objectives and targets. Define a desired result, then let your employees in the areas where the objectives and 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 your goals, as well as recommend what is realistically feasible. And remember, involving employees at all levels helps to build commitment to the EMS.

As you set your objectives and targets, don't forget to account for existing programs that are working well. For example, if you currently have an environmental preferred purchasing program or a material substitution effort that is producing results, think about other non-hazardous chemical substitutions based on your significance analysis. What programs have worked well in the past and what could or would have made them better?

Step 2) Identify Your Objectives and Establish Target(s)

Remember the sanitary sewer overflow (SSO) example that we analyzed for significant environmental impact?

Operation/Activity	Aspect	Impact
Repairing/Maintaining Manholes	Use of Oils and Lubricants	- Depletion of a Natural Resource - Contamination of Water/Land
Repair Leaking Sewer Lines	Energy Use	- Depletion of a Natural Resource - Employee H&S
Operate & Maintain Pump Stations	Sewer System Overflows (SSOs) – i.e., spills	- Degradation of Water/Land (Streams, Creeks, Soil, etc.) - Impact to Public Health

Keep your number of objectives and targets small and manageable to start. You can always expand the number of environmental goals you want to accomplish as your EMS matures.

Rick Bickerstaff
Charleston, South Carolina
Commissioners of Public Works

Three Keys to Success

(from wastewater facilities):

1. Post your organization's objectives and targets around your facility so staff can physically see the status or plan of your goals and objectives.

2. Score "quick wins" with your objectives and targets to bring about success and show management and employees that your EMS is paying off—environmentally and financially.

3. Establish operational controls (work instructions, training, roles & responsibilities, etc.) for all significant aspects, including your objectives and targets and EMPs.

In this example, that the SSOs, based on their potential impact, scored a 16 when reviewed for significance. Since you set your significance threshold at 15, SSOs became a significant aspect.

Operation/ Activity	Aspect	Impact	Land Impact	Air Impact	Water Impact	Health & Safety	Total Score
Operate and Maintain Pump Stations	Sewer System Overflows (SSOs)	-Degradation of Water/Land (Streams, Creeks, Soil, etc.) - Impact to Public and Worker Health	5	1	5	5	16

Now let's look at setting an objective and target to improve our management of SSO events. After reviewing your technical and financial options, legal requirements, and the views of your local community stakeholders, what is a performance-driven, but achievable objective and target? Also remember that the best targets are those that are measurable.

Therefore, consider your current baseline data and/or your organization's ability to collect a good baseline for a particular target. The following objective and target serves as an example for decreasing the potential environmental impact of the sanitary sewer operations and maintenance division, with a focus on decreasing the number or percentage of SSOs.

Significant Aspect	Objective	Target
Sewer System Overflows (SSOs)	Reduce the number of sewer system overflows (i.e., spills)	Reduce SSOs by 40% from FY 2002 & 2003 normalized baseline levels

"Sometimes behavior-based targets (e.g., learning a systems-based management approach) are not the biggest gains in performance measures related to your targets, but they are very important in terms of culture change and should be considered."

Donna Adams
Eugene, Oregon
Wastewater Division

Example Objectives and Targets from Wastewater 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
Engine Generator Operation in Equipment Maintenance	Reduce Air Emissions	Reduce Sulfur Dioxide Emissions (lbs) from the Engine Generators by 85% (Baseline 2002)
Potable Water Used in Mixing of Polymer (Gravity Belt Thickener Operation and Belt Filter Press Operation)	Reduce Potable Water Use	Reduce potable water use (gallons) by 10% (Baseline 2002)
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

Step 3) Define the Performance Indicator(s) You'll Use to Measure Your Targets

Performance indicators are what you will need to measure your performance in meeting your established targets. In the case of environmental regulations they may already be spelled out. However, when it comes to your objectives and targets you will need to identify appropriate "performance" indicators to track and assess progress towards meeting your established goals.

Now that you've established a sample environmental objective and target, set a parameter to measure the performance of a target, such as reduction of SSOs events by 40% from 2002 levels.

Significant Aspect	Objective	Target	Performance Indicator
Sewer System Overflows (SSOs)	Reduce the number of sanitary sewer system overflows (i.e., spills)	Reduce SSOs by 40% from FY 2002 & 2003 normalized baseline levels	# of SSO events per year

Factors to consider in setting objectives and targets

▶ Ability to control
▶ Ability to track /measure
▶ Cost to track /measure
▶ Progress reporting
▶ Links to your environmental policy's 3 commitments

NOTE

Your performance indicators should be simple and understandable; measurable; and relevant to what your organization is trying to achieve (i.e., its objectives and targets).

Performance Indicators: A Few Words about Measuring Your Progress

When you establish quantifiable objectives and targets you first need to establish a baseline. This baseline serves as the starting point from which you will measure your progress. For example, if you set an objective to reduce hazardous waste and a target to reduce the waste by 10% by 2005, what does that mean? fifty pounds, 100 pounds, or 1000 pounds? You will first need to determine how much hazardous waste was generated the previous year. Is information available to make this calculation? If not, what level of effort is necessary to define the baseline? You may find that no baseline data exist. If so, do not let this stop you from moving forward. Set a plan to determine your baseline as a first step.

A Word About "Normalized" Baselines

To accurately measure how your facility performance is changing over time, establish "normalized" baselines where appropriate. Normalized baselines will measure your actual environmental performance changes rather than changes in production, customer demand, or other non-environmental related factors.

For example, if you were measuring the amount of salt used on your facility roads, you would want to establish a normalized baseline because the amount of snow and ice you get (and therefore, the salt you will use) will vary from year to year. Average your salt use over two or three years to normalize the salt you use to get an accurate baseline from which to measure.

REMEMBER

When setting up the EMPs for your wastewater facility, consider that you may already have baseline data that measure and track your objectives and targets. For example, if your target was to decrease the amount of total dissolved solids in your effluent by 10%, you probably already have baseline effluent data from which to start to track your success in meeting a 10% reduction.

Environmental Management Programs (EMPs)

At this point, you have identified your significant aspects and set objectives and targets for those that you want to improve performance. Now it is time to look at how you will achieve these goals. An important part of your EMS is developing step-by-step action plans that define how your organization intends to reach its objectives and targets. These action plans (roadmaps) are called Environmental Management Programs or EMPs.

Your EMPs are directly linked to your objectives and targets—that is, they describe how your organization will translate its goals into concrete action plans so that environmental objectives and targets are achieved.

Establish your environmental practices as a way of ensuring that your EMS objectives and targets will be met. For example, the QualServ program, supported by the Water Environment Federation (WEF) and American Water Works Association (AWWA), has developed a series of best management practices that you may wish to consult. Remember—build on what's already out there in your industry!
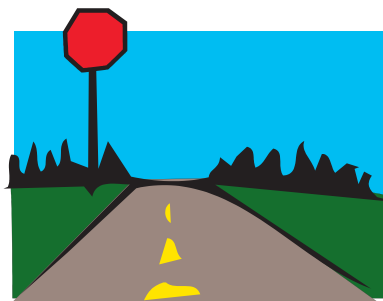
Step 4) Establish Your EMPs (Actions Plans)

Now that you have set an objective and target for your wastewater facility, how will you achieve it? How will you accomplish your goals? Let's look at the SSO example again and develop a program (EMP) for achieving the target of reducing SSO events.

Your EMP should (step-by-step):
  a) List the individual tasks (what and how will you do it?)
  b) Assign responsibility for achieving goals (who will do it?)
  c) Establish deadlines (by when?) for individual tasks
  d) Estimate staff time and costs (how much?)

Use the sample Action Plan or EMP on the next page (or a similar method) to manage and track your objective and targets.

NOTE

If you do not have baseline data for a particular objective and target, the first step in your EMP could be to establish the baseline.

Step 4a) List the Individual Tasks Required to Meet Your Target

Area/Operation: Sanitary Sewer Operations and Maintenance
Significant Aspect: Sewer System Overflows (SSOs)
Objective: Reduce the number of SSOs
Target: Reduce SSOs by 40% from FY 2002 & 2003 normalized baseline levels
Start Date: 6/15/04
Completion Date 6/15/06

Tasks
Create Baseline Data (Normalized from CY 02 & 03 SSO events)
Develop a System to Document Causes/Locations/ Sources, etc. of SSOs
Implement a Fats, Oils & Greases (FOG) Program
Communicate and Update Staff and Implement Public Outreach Program
Implement and Optimize Preventative (PM) Maintenance Program
Install SCADA and Flow Metering Devices to Improve Pump Station (PS) Inspection and Monitoring System
Communicate and Update Staff
Develop Capacity, Management, Operation, and Maintenance (CMOM) Program
Communicate Changes to Staff
Track SSO events for CY 06 & 07 and Compare Against your Target

Three Lessons Learned
(from wastewater facilities):

1. Track, review, and communicate the status of your objectives and targets, and action plans, on a regular basis (i.e., monthly to ensure they are on track). Report on your objectives in a monthly status report to top management.

2. Ask for volunteer(s) to "own" the objectives and targets. This allocates roles and responsibilities and increases EMS buy-in.

3. Keep in mind as you develop your objectives and targets and EMPs (Action Plans) that operations and divisions may have different priorities. Try and relate to each group when setting your goals. For example, show the cost savings of your objective to management and show the safety benefits to frontline employees.

REMEMBER

"What gets measured, gets managed."

Peter Drucker
Management Expert

Involve employees early that will participate and have responsibility in meeting your targets to establish and carry out your programs. Also, clearly communicate the expectations defined in your programs to those with responsibilities. Check in frequently with key EMP staff. How are they progressing? Are there any problems or concerns? Communicating with staff on your objectives and targets and subsequent Action Plans will head off or manage problems that may arise. Make sure any hurdles or issues are communicated early to management so that resources can be re-directed as necessary.

Step 4b) Assign Responsibility

Assign responsibility both for the overall EMP and for the individual tasks. Make sure you communicate and confirm this with managers and staff in responsible areas.

Area/Operation: Sanitary Sewer Operations and Maintenance
Significant Aspect: Sewer System Overflows (SSOs)
Objective: Reduce the number of SSOs
Target: Reduce SSOs by 40% from FY 2002 & 2003 normalized baseline levels
Start Date: 6/15/04
Completion Date 6/15/06

Tasks	Staff
Create Baseline Data (Normalized from CY 02 & 03 SSO events)	McIntyre
Develop a System to Document Causes/Locations/ Sources, etc. of SSOs	Scott
Implement a Fats, Oils & Greases (FOG) Program	Franklin
Communicate and Update Staff and Implement Public Outreach Program	Prescott & Murray
Implement and Optimize Preventative (PM) Maintenance Program	Martin
Install SCADA and Flow Metering Devices to Improve Pump Station (PS) Inspection and Monitoring System	Jones
Communicate and Update Staff	Prescott
Develop Capacity, Management, Operation, and Maintenance (CMOM) Program	Solich
Communicate Changes to Staff	Smith
Track SSO events for CY 06 & 07 and Compare Against your Target	Enders

Step 4c) Establish Deadlines for Individual Tasks

Plan intermediate deadlines for your EMPs. Incorporating deadlines give those responsible a sense that this is important and needs to be accomplished in a timely manner.

Area/Operation: Sanitary Sewer Operations and Maintenance
Significant Aspect: Sewer System Overflows (SSOs)
Objective: Reduce the number of SSOs
Target: Reduce SSOs by 40% from FY 2002 & 2003 normalized baseline levels
Start Date: 6/15/04
Completion Date 6/15/06

Tasks	Staff	Deadlines
Create Baseline Data (Normalized from CY 02 & 03 SSO events)	McIntyre	07/01/04
Develop a System to Document Causes/Locations/ Sources, etc. of SSOs	Scott	08/30/04
Implement a Fats, Oils & Greases (FOG) Program	Franklin	09/30/04
Communicate and Update Staff and Implement Public Outreach Program	Prescott & Murray	10/15/04
Implement and Optimize Preventative (PM) Maintenance Program	Martin	12/30/04
Install SCADA and Flow Metering Devices to Improve Pump Station (PS) Inspection and Monitoring System	Jones	06/31/05
Communicate and Update Staff	Prescott	08/01/05
Develop Capacity, Management, Operation, and Maintenance (CMOM) Program	Solich	11/30/05
Communicate Changes to Staff	Smith	12/30/05
Track SSO events for CY 06 & 07 and Compare Against your Target	Enders	01/01/06 to 12/31/07

Three Things to Avoid

(from wastewater facilities):

1. Biting off more than you can chew. Begin with only two or three objectives and targets and make sure they are attainable and feasible for your facility.

2. Not communicating time and resource requirements to divisional and line managers and supervisors so they can alert their employees of their objective and target and EMP responsibilities.

3. Not establishing a normalized baseline from which to measure your 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.

Provide a reality check on your EMPs with line managers, department heads, and supervisors whose operational staff and management are involved.

✓ Are the appropriate staff members responsible?

✓ Does the timing conflict with other operational priorities?

✓ Do the tasks seem logical and sufficient to accomplish the target?

Step 4d) Estimate Staff Time and Costs

Confirm with managers that the resources (financial and human) are consistent with what was described in the approved budget. Are there other direct costs for materials? Equipment? Outside services? This point further reinforces the need to keep management actively involved and ensure that they are in agreement and committed to planned activities.

Area/Operation: Sanitary Sewer Operations and Maintenance
Significant Aspect: Sewer System Overflows (SSOs)
Objective: Reduce the number of SSOs
Target: Reduce SSOs by 40% from FY 2002 & 2003 normalized baseline levels
Start Date: 6/15/04
Completion Date 6/15/06

Tasks	Staff	Deadlines	Time (in Person Hours)	Estimated Costs
Create Baseline Data (Normalized from CY 02 & 03 SSO events)	McIntyre	07/01/04	20	$$$
Develop a System to Document Causes/Locations/ Sources, etc. of SSOs	Scott	08/30/04	20	$$$
Implement a Fats, Oils & Greases (FOG) Program	Franklin	09/30/04	40	$$$
Communicate and Update Staff and Implement Public Outreach Program	Prescott & Murray	10/15/04	16	$$$
Implement and Optimize Preventative (PM) Maintenance Program	Martin	12/30/04	80	$$$
Install SCADA and Flow Metering Devices to Improve Pump Station (PS) Inspection and Monitoring System	Jones	06/31/05	120	$$$
Communicate and Update Staff	Prescott	08/01/05	16	$$$
Develop Capacity, Management, Operation, and Maintenance (CMOM) Program	Solich	11/30/05	120	$$$
Communicate Changes to Staff	Smith	12/30/05	16	$$$
Track SSO events for CY 06 & 07 and Compare Against your Target	Enders	01/01/06 to 12/31/07	40	$$$

Total Estimated Cost for this EMP   **$$$**

Step 5) Get Top Management's Commitment and Approval

Get top management buy-in and approval for your objectives and targets and EMPs. Top management needs to ensure that your objectives are integrated with other organizational objectives and are consistent with the overall mission of your facility. Management also needs to know what the efforts of achieving these goals will cost in terms of staff time and capital expenditures, the length of time needed to accomplish this effort, how it will interface with periods of high operational priority, and who will be involved in the tasks.

Step 6) Develop a Procedure for Setting Objectives & Targets and Establishing EMPs

When you're satisfied that your process for setting objectives and targets and establishing EMPs conforms to the EMS requirements, it's time to document the process in a system procedure. Your system procedure clearly defines what you will do, roles and responsibilities, when you will do it, how information will be communicated, and where information will be stored. This documented procedure will be a consistent, easily accessible, and clear guide for ensuring that this important element of your EMS is carried out according to plans.

For a sample procedure on setting Objectives and Targets and example Environmental Management Programs for a wastewater facility, see Appendix A.

Step 7) Check Your Objectives & Targets and EMPs for EMS Conformance

Once you have established your environmental objectives and targets, review the process for EMS conformance.

Check ✓
1. Are there documented objectives and targets applicable to the organization?

2. Are your objectives and targets consistent with your Environmental Policy goals?

Policy

EMS Manual

Procedures

Work Instructions, Forms, Drawings, etc.
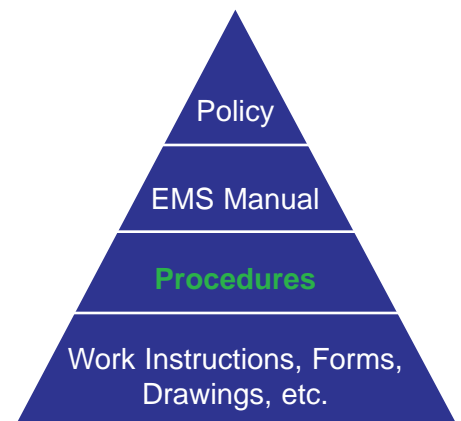
An objective and target and EMP **procedure** is recommended for this element. A system procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed for this element.

Involving Contractors and Temporary Staff

On-site contractors and temporary staff may work in areas in which there are significant aspects or where objectives and targets have been set. Communicating your objectives and targets and EMPs to contractors and temporary staff is important and can get you needed buy-in on what you are trying to accomplish. Also, keep in mind that your suppliers (of services or materials) can help you in meeting your objectives and targets (e.g., by providing more "environmentally-friendly" products).

3. Did you consider your legal and other requirements; significant environmental aspects; technical options; the views of your internal and external stakeholders; and your financial, operational, and business realities when setting your objectives and targets?

4. Did you set quantifiable performance indicators for your targets?

5. Are environmental performance improvements noted and tracked?

6. Are programs (plans) set to implement your objectives and targets?

7. Do you regularly communicate progress of your objectives and targets to management?

Step 8) Communicate Your Objectives & Targets and EMPs

Communicate your objectives and targets and action plans to employees, suppliers, contractors, and external stakeholders. Open communication will increase buy-in of your environmental goals and what you are trying to accomplish. In addition, communication of your goals and plans will keep the EMS on everyone's radar and ensure that your organization is on the path to continuous improvement (i.e., your goals are seen as important and a priority).

Step 9) Review and Revise Your Objectives & Targets and EMPs

Once you have your objectives and targets in place and have determined the steps (in the form of your EMPs), for achieving your goals, remember that a fundamental element of the EMS is to review, assess, and improve (i.e., continual improvement!). Revisit your objectives and targets and EMPs on a regular basis as you conduct internal EMS audits and EMS management review, to ensure that your organization is on the right path, and moving toward meeting its commitments in your environmental policy and goals. This review is especially important if you have any new or modified operations. Consider leveraging your regular EMP tracking efforts as a vehicle, or opportunity, to continually share and discuss progress with top management.

Setting Objectives & Targets and Establishing EMPs

(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- ❍ Identify environmental goals (objectives and targets) that address your wastewater facility's significant environmental impacts.
- ❍ To establish and maintain environmental management programs (action plans) for achieving your organization's objectives and targets.

The **Results** of this EMS element are:
- ❍ Environmental objectives and targets that are documented and communicated.
- ❍ EMPs (action plans) for meeting your environmental objectives and targets.

Before You Begin this EMS element:
- ❍ Complete your significant aspects and impacts analysis.

ISO 14001 Requirements	Key Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Objectives & Targets The organization shall establish and maintain documented environmental objectives and targets, at each relevant function and level within the organization. When establishing and reviewing its objectives, an organization shall consider the legal and other requirements, its significant environmental aspects, its technological options and its financial, operational and business requirements, and the views of interested parties. The objectives and targets shall be consistent with the environmental policy, including the commitment to prevention of pollution.	**Environmental Policy** – Your environmental objectives and targets will guide the vision of your Policy. **Environmental Aspects** – When establishing your objectives and targets, look first at your significant environmental aspects. **Legal & Other Requirements –** Consider what regulations and other requirements you must comply with as you set your objectives and targets. **Structure & Responsibility**– Top management must commit to and approve your objectives and targets. Any employee can contribute to establishing and setting parameters for your objectives and targets. **Environmental Management Programs -** EMPs are the action plans that will layout how your objectives and targets will be accomplished. **Monitoring & Measurement**– Establish baselines and metrics of performance for your objectives and targets. **Management Review** – The progress of your objectives and targets will be a major agenda item at management review meetings to see how your EMS is functioning.	Documented Objectives and Targets	Pollution Prevention Plans Other Business or Organizational Goals

ISO 14001 Requirements	Key Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Environmental Management Programs (EMPs) The organization shall establish and maintain (a) program(s) for achieving its objectives and targets. It shall include: a) designation of responsibility for achieving objectives and targets at each relevant function and level of the organization; and b) the means and time-frame by which they are to be achieved. If a project relates to new developments and new or modified activities, products or services, program(s) shall be amended where relevant to ensure that environmental management applies to such projects.	**Environmental Aspects** – When developing your EMPs for your objectives and targets, look first at your significant environmental aspects. **Objectives and Targets** – Your EMPs manage and track (who, what, by when, how much) your objectives and targets. **Monitoring & Measurement** – Establish baselines and metrics of performance for your quantitative objectives and targets and subsequent EMPs. **Management Review** – The progress of your objectives and targets and subsequent EMPs will be a major agenda item at management review meetings to see how your EMS is functioning.	Documented EMPs to manage your Objectives and Targets	Environmental Management Program Progress Report Form

Phase III: Implementing

You are now ready to begin the Implementation Phase of the EMS cycle. Each section of this Handbook will guide you step-by-step through each of the EMS activities. Refer to the icons for case studies, sample documents, keys to success and other implementation assistance. At the end of each section, two handy reference sheets review the **Purpose** of each requirement, describe the **Results** you'll be developing, discuss how to **Prepare** to do the work, and show how the element links to other EMS requirements.
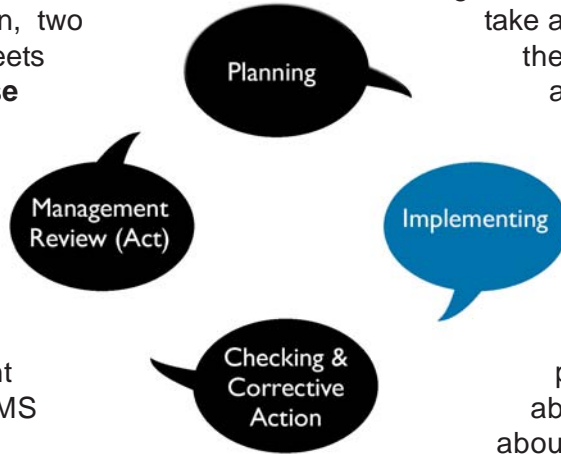
lishing performance indicators for each of your environmental targets to assess your EMS progress. This phase includes defining implementation team roles and responsibilities and establishing internal and external lines of communication. The activities in this phase will allow your organization an opportunity to take a more focused look at the specific operations and services that you decided were most significant for your wastewater facility. If you are using a two-year implementation strategy, the activities in this phase can be comfortably accomplished in about nine months.

In this phase, you will be focusing on managing significant aspects that were defined in the Planning Phase and establishing

Here's a checklist of requirements in this Phase:

Phase III EMS Requirements (9 months)	
Structure and Responsibility (See Section 2: Getting My Facility Ready to Implement an EMS)	✓
Training, Awareness, and Competence	✓
Internal and External Communication	✓
EMS Document and Records	✓
Operational Control	✓
Emergency Preparedness and Response	✓

Section 3: Training, Awareness, and Competence

As should be apparent from the previous sections of this manual, cross-sectional involvement from across your EMS fenceline and organization is the key to a successful and viable EMS. What's the first step in achieving involvement? Training and awareness!

As you have learned by now, buy-in and understanding an EMS is not automatic, especially when reaching out to various levels within your organization. The context of your message and the level must be applicable to the staff receiving the message in order for them to connect their particular work activities and job functions to the EMS. In addition, sound operational management requires that personnel understand and follow the procedures outlining their roles and responsibilities. This simply cannot be accomplished without, you guessed it—training!

Want two great reasons to train employees about environmental management and your EMS?

- Every employee *can* have potential impacts on the environment; and,

- Any employee *can* identify positive ways in which to improve environmental management.

As part of your EMS, you will verify (i.e., have documented training records) that everyone has received general awareness training about the EMS, your environmental policy, and what the EMS means to each employee doing his/her job. You will also verify that each person whose job involves a significant environmental aspect is trained and competent (i.e., based on certification, education, etc.) to implement procedures and follow regulations to minimize the environmental impact of their operations.

Step-by-Step Guide to Training and Awareness

Step 1) Assess EMS Training Needs
Step 2) Review and Integrate EMS Training with Your Current Training and Methods
Step 3) Conduct, Document and Maintain Training Records
Step 4) Develop a System Procedure/Plan for EMS Training, Awareness & Competence
Step 5) Check Your Training, Awareness and Competence for EMS conformance

Key Section Terms
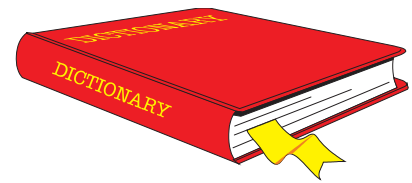
EMS Awareness Training – Training involving an overview of the basics of your EMS, including your environmental policy, significant aspects, objectives and targets, and the importance of operating under specific procedures and work instructions (operational controls) required under the EMS.

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.

System Procedure – An EMS required document that establishes an element's purpose, scope, roles & responsibilities, the tasks to be completed, and where and how the associated records and documents are maintained.

Assessing Training— Ask Yourself:

- What jobs affect the environment?
- What job activities involve a significant aspect?
- What types of training do we currently conduct in these areas?
- Can EMS roles/responsibilities/ controls be included in this training?
- Can we tweak the training material we already have or do we need to develop new materials?
- How do we currently maintain training records?

Step 1) Assess EMS Training Needs

All personnel receive training. Environmental/EMS training should be tailored to the different needs of employees and to various levels or functions in your wastewater organization. For example, someone in operations who handles hazardous chemicals will need a different type of environmental training from someone in procurement who purchases hazardous chemicals. However, keep in mind that both employees could potentially have significant impacts on the environment and must receive at least general EMS awareness training.

Who needs to receive environmental training at your facility? In assessing EMS training needs for your wastewater facility, consider both general and specific needs. For example:

▶ "What environmental management procedures affect Stu's daily work and what happens if they aren't followed?"
▶ "What environmental impacts might Stu's work cause?"
▶ "What legal non-compliance issues might Stu's work potentially raise?"
▶ "What broad understanding of environmental issues and the EMS does Stu need?"
▶ "What type of training does Stu currently receive?"

For your EMS, <u>everyone</u> must understand:
1. The environmental policy
2. The significant environmental impacts of his/her work activities
3. The environmental objectives and targets you have set
4. Key EMS roles and responsibilities
5. Environmental procedures and work instructions that apply to their work
6. The importance of following your EMS and environmental requirements, and the potential consequences of not doing so.

Step 2) Review and Integrate EMS Training with Your Current Training and Methods

Build on what you have in place and what currently works. Do you have an existing training procedure or plan? If so, build upon this to ensure that you are meeting your EMS requirements. Also, look at the training you conduct for environmental compliance, health and safety, and other related areas. What about certification training? You may find that many of your existing training efforts will satisfy some of the requirements for your wastewater EMS.

REMEMBER

Every person at your wastewater treatment facility can play a role in environmental management. Train your employees to help them understand their roles and responsibilities.

Step 3) Conduct, Document and Maintain EMS Training Records

Just like any other training you conduct, you will need to document and maintain (verify) your EMS training. For an EMS auditor, training can be verified by a signature and date that an employee attended a class on EMS Awareness. Another idea is an updated training matrix tracking training sessions and required and actual attendance. Again, consider how you currently track training needs and participation.

Remember, for your EMS, you need to train all employees on the EMS basics, including your environmental policy, objectives and targets, and how the EMS applies to their day-to-day activities. In addition, employees in areas with the potential to create significant environmental impacts must understand how to minimize those impacts and the potential consequences of not following EMS requirements.

CASE STUDY

At the New Hampshire Department of Transportation (NH DOT), Bureau of Traffic, an effort was made to combine the training requirements of the Safety and EMS programs. Combining the training programs helped reduce the overall time spent in training and administration of the their programs. For example, 127 full and part time positions needed training. By combining the training requirements, the Bureau of Traffic saved about 7.5 hours each year per employee. This amounted to 127 additional workdays that was available to perform normal work activities.

EMS and Competence

What does it mean to be competent in your job under an EMS? It means that employees in certain jobs (particularly operations that can cause significant environmental impacts) have a combination of education, training, and experience to do their day-to-day tasks and ensure that your organization properly manages its significant aspects and environmental impacts. Make sure you maintain records of their experience and training (certifications, education, and previous job records, etc.) just as you would any other verifiable training records at your facility.

Consider cost effective and creative ways to train your staff on your EMS. For example, use a video for EMS awareness training. Computer-based training also may be an option, especially for employees who spend much of their time in the field and/or work varying hours/shifts.

Involving Contractors and Temporary Staff

Make sure that contractors and temporary staff are trained on the basics of your EMS (awareness, policy, emergency response, etc.). They need specific training on their roles and responsibilities in areas that can cause significant impacts or in which objectives and targets are set. The wastewater facilities that have EMSs in place that contributed to this Handbook provide general EMS awareness training to their contractors and temporary staff, and involve them in the aspect/impact analysis and in the setting of objectives and targets if their work can cause a potential environmental impact.

Three Lessons Learned
(from wastewater facilities):

1. 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.

A sample training matrix is attached at the end of this section and in Appendix B.

2. Get feedback from employees on the effectiveness of training materials and adjust your training based on their feedback.

3. Make your EMS training part of other training you currently conduct (e.g., new employee orientation, health and safety, etc.).

Policy

EMS Manual

Procedures

Work Instructions, Forms, Drawings, etc.
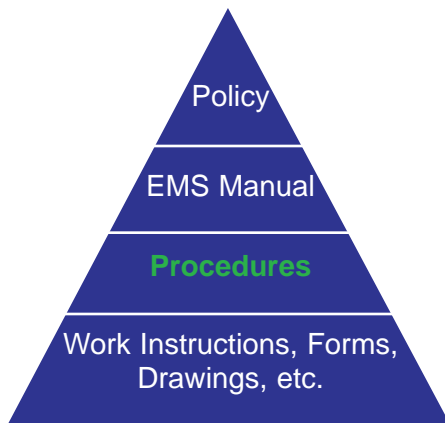
*A Training, Awareness, and Competence system **procedure/plan** is required for this element. A system procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed for this element.*

Step 4) Develop a System Procedure/Plan for EMS Training, Awareness & Competence

When you're satisfied that your process for training, awareness, and competence conforms to the EMS requirements, document the process in a system procedure, and update your training plan. Remember, most organizations have some type of training in place before they begin their EMS. Build off your existing procedures and plans.

Your system procedure should clearly define what you will do, roles and responsibilities, when they will do it, how the information will be communicated, and where the information will be stored. This documented procedure will be a consistent, easily accessible, and clearly ensure that this element of your EMS is carried out according to plans.

For samples of Training, Awareness, and Competence procedures from wastewater facilities, see Appendix A.

> ### CASE STUDY
> Training doesn't always have to be done in a classroom setting. The City of San Diego Environmental Services Department, Refuse Disposal Division conducted some of its EMS awareness and competency training in "tailgate sessions." Rather than pulling personnel off-site for training, they took the training sessions to their employees. Before starting up equipment in the morning or during breaks, personnel would gather and receive training on the environmental policy or a new work instruction. This approach saved a significant amount of time and eliminated the need to pull personnel off-site for training.

Three Things to Avoid
(from wastewater facilities):

1. Making your EMS training too technical or "jargony." Remember the KISS principle!

2. Conducting training sessions that are too long. Keep your training sessions short, interesting and to the point.

3. Having training sessions that "preach" EMS or environmental requirements. Remember to keep a "blue jeans, no tie" (relatable) message.

Step 5) Check Your Training, Awareness and Competence for EMS Conformance

About two or three months after you have documented and implemented your training, awareness, and competence procedure, check to see if it is actually working according to your plan. Here are some questions to investigate:

Check ✓

1. Do you have a current process for conducting environmental training?

2. What types of environmental training do you currently provide?

3. Have you conducted EMS Awareness training for all employees?

4. Have you conducted specific training for employees in significant aspect areas?

5. How do you verify competence?

6. How do you evaluate training effectiveness?

Training, Awareness, and Competence

(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- ❍ Identify and track environmental and EMS training requirements.

The **Result** of this EMS element is:
- ❍ A system procedure/plan (EMS document) that identifies and tracks your environmental and EMS training needs.

Before you Begin this EMS element:
- ❍ Acquire a knowledge on your organization's current training programs and methods.
- ❍ Complete your environmental aspect and impact assessment and determine significance.

ISO 14001 Requirements	Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Training, Awareness and Competence The organization shall identify training needs. It shall require that all personnel whose work may create a significant impact upon the environment, have received appropriate training. It shall establish and maintain procedures to make its employees or members at each relevant function and level aware of a) The importance of conformance with the environmental policy and procedure and with the requirements of the EMS; b) The significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance; c) Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the EMS, including emergency preparedness and response requirements; d) The potential consequences of departure from specified operating procedures. Personnel performing the tasks which can cause significant environmental impacts shall be competent on the basis of appropriate education, training and/or experience.	**Environmental Aspects -** Employees that work in areas of potential significant impact need to be aware they are in these areas, and need to be trained on ways to minimize potential significant impacts. **Legal and Other Requirements -** Employees in regulated areas should be trained and have knowledge of regulatory requirements and the consequences of noncompliance. **Structure & Responsibility -** All employees need to understand and be trained in their EMS roles and responsibilities, including the basics of your EMS and your EMS Policy. **Records -** Conduct, document, and maintain training and competency records, including EMS awareness and training on significant aspects and objectives and targets.	Training Plans/Procedures Environmental Training Records EMS Awareness Training EMS Significance Area Training Certificates/Education Records (to verify competency) in significant areas	Job Category Training Matrix

The EMS Coordinator ensures delivery of he appropriate training modules according to this matrix to all personnel within the EMS scope.

Training Modules	Content	Staff							Contractors				
		Operations Managers	Planning Officer	Engineering Officer	Engineering Technicians	Operations	Field Operations Supervisor	Other Field Staff	Other Office Staff	Supervisor	Engineering | Roads	Layout	Hauling
EMS 1	EMS Awareness	X	X	X	X	X	X	X	X	X	X	X	X
EMS 2	EMS Procedures	X		X	X	X	X	X					
Procedures and Wls 1	Job Specific Procedures				X	X	X	X		X	X	X	X
Legal Requirements	CMOM			X	X	X	X	X		X	X	X	
	CWA	X			X	X	X			X			
	Pretreatment	X	X	X	X	X	X	X	X	X	X		X
Emergency	Action Plans				X	X	X	X		X	X	X	X
	Spill Response				X	X	X	X		X	X	X	X

Section 3: Communication—Internal and External

A central component of any EMS is to establish clear communication channels both internally within your organization and externally to interested parties. Effective, proactive communication is often an unexpected, but a welcome benefit of EMS implementation. You need to establish and implement procedures that describe how your organization:

1. Ensures effective internal communication through the flow of information from the top down, from the bottom up, and across your entire EMS fenceline;
2. Solicits, receives, documents, and responds to external communications; and,
3. Considers and records external communications on your significant environmental aspects.

Internal Communication: Do employees within your organization understand with whom to talk regarding your EMS and environmental procedures, emergency situations, and legal and other requirements? Communication requires the involvement of everyone within your organization. Internal communication is important to keep staff aware of your EMS, EMS success stories, and any changes to your operations and services that affect your EMS.

External Communication: As public organizations, it is important to consider proactively communicating with your local community and other interested stakeholders (e.g., regulatory agencies, citizens, Commissioners, etc.) about your EMS. Taking the initiative to obtain the views of your external stakeholders will help you better understand how the community feels about your facility. Also, getting their buy-in on your EMS will help ensure that you are identifying their most important environmental issues.

Key Section Terms

External Communication – Providing information and soliciting input, receiving inquiries and complaints, responding, and documenting exchanges with interested parties outside the fenceline of your facility.

Internal Communication – Flow of information top-down, bottom-up, and across your entire EMS fenceline.

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 your fenceline–to be interested parties.

System Procedure – An EMS (ISO 14001) required document that establishes purpose, scope, roles & responsibilities, the tasks to be completed, and where and how the associated records and documents are maintained.

Step-by-Step Guide to Communication

Step 1) Determine What Needs to be Communicated **Internally** to Your Organization
Step 2) Determine Who You Currently Communicate With **Externally**
Step 3) Determine Who has an Interest and Who has a Potential Effect on Your EMS
Step 4) Define How Your Organization Can Best Reach External Stakeholders
Step 5) Develop an EMS System Procedure(s) for Internal and External Communications
Step 6) Check the Communication Procedure(s) for EMS Conformance

Common Wastewater External Interested Parties ("Stakeholders")

- Local citizen/community groups
- Neighbors
- State/local environmental groups
- Regulatory agencies
- Advisory groups
- Local Officials
- Emergency response personnel
- Contractors and vendors

COACH'S CORNER

Remember that great ideas come from front-line employees that work directly in areas that affect your wastewater facility's environmental impact. Make sure there are ways for them to provide feedback to their line managers and to top management.

Step 1) Determine What Needs to be Communicated <u>Internally</u> to Your Organization

A good place to start in developing your EMS communication strategy is to look at how your organization currently communicates messages internally. How do managers currently get information to employees and receive information and communicate back to managers? How do line managers communicate with one another? Leverage these strategies that are already in place, especially those that are familiar to personnel.

REMEMBER

Keep your communications simple, fresh and to the point. Think KISS! Also remember, the EMS is about continuous improvement.
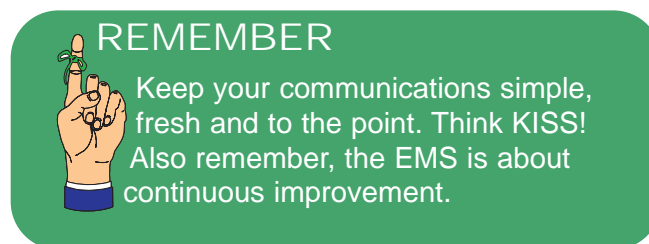
Internal Communication Vehicles

♦ Employee Meetings
♦ Environmental, Health, and Safety Training
♦ Working Lunches (free food!)
♦ Newsletters
♦ Pay Stub Inserts
♦ Intranet
♦ Bulletin Boards

For a sample EMS newsletter, see Appendix B

Step 2) Determine Who You Currently Communicate With <u>Externally</u>

Once you have your EMS internal communication strategy in place, the first step in determining your external communication strategy is to identify with whom you are currently communicating. As a public organization, you probably already have external stakeholders that you talk with, including City Commissioners, local citizens and citizen groups, the Mayor, regulatory agencies, etc.

Many public organizations find that when they reach out within their local communities, sometimes for the first time, they are well-received and confronted with "Why haven't you asked us before? We have some great ideas to share."

While ISO 14001 does not require an organization to have a truly proactive external communications program, in all likelihood it will benefit you organization and your EMS if you make a strong effort to reach out to key external stakeholders. While the timing and nature of this outreach is up to you, you may wish to consult with key stakeholders *why* you have chosen to implement an EMS and what you want to get out of it. Finally, you are encouraged to keep key stakeholders abreast of your progress as you develop the EMS and how your system is performing once it is in place. Again, the final decision is always up to you, but as a public agency you have an obligation to work closely with your key stakeholders.

CASE STUDY

The Lowell, Massachusetts Wastewater Treatment Plant asked local residents to assist in efforts to address the facility's odor issues. Residents in a chosen target area recorded weather information on days the odor was prevalent, as well as the degree of the odor and the time the odor occurred. This information identified a pattern of specific conditions during which odors were most prevalent. The City of Lowell responded by making changes to its operational patterns during times when those specific conditions had occurred and, in turn, established greater trust within the local community.

Step 3) Determine Who has an Interest and Who has a Potential Effect on Your EMS

Once you've identified with whom you currently communicate externally, define additional external stakeholders or new methods of communicating by determining: 1) who potentially has an interest in your EMS and 2) who potentially has an affect on your EMS.
In determining what to communicate to your external interested parties, your organization will need to assess the extent to which your strategy will be proactive. Ask:

- What is your current level of public acceptance?

- What are your external stakeholder's concerns?

- Have you had public relations issues in the past that require certain strategies or cautions?

- Since communication is most effective when it's a two-way dialogue, what type of input from them would interest you most and be most useful?

- What will be the return on investment of a proactive approach?

Three Things to Avoid
(from wastewater facilities):

1. Starting your EMS communication plans and procedures from scratch. Build on existing communication methods.

2. Not communicating frequently on the progress of your EMS. Instead, send management and employees regular status updates of your EMS (i.e., send three EMS "good news bullets"
each month in your newsletter).

3. Not identifying and communicating with your key external stakeholders and seeking their input. The local community and other external stakeholders, if informed on what you are trying to achieve, can be critical allies for your organization.

COACH'S CORNER
Your organization may want to take 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 your facility—this will lead to increased appreciation for your wastewater services by the community.

Step 4) Define How Your Organization Can Best Reach External Stakeholders

Now that you've determined who your external stakeholders are and the potential reasons why they might have an interest and effect on your EMS, determine how to best reach your external stakeholders. Consider the following methods that wastewater facilities with an EMS have used.

External Communication Vehicles

- Annual Reports
- Steering Committees and/or Advisory Groups
- Media Releases
- Open Houses and Tours
- Websites
- Surveys
- Mailings & Newsletters to Local Communities

NOTE

Find out which issues are of greatest interest to your external stakeholders and focus your efforts on what those issues (i.e., health and safety, compliance, SSO runoff into waterways, odor issues, etc.).

Step 5) Develop an EMS System Procedure(s) for Internal and External Communications

When you are satisfied that your process for internal and external communications conforms to the EMS requirements and that it allows your organization to achieve its goals for enhancing communication, document the process in a system procedure. As with all EMS system procedures, it needs to clearly define what, when, how, and where.

For samples of Internal and External Communications procedures from wastewater facilities, see Appendix A.

> *From the beginning, we involved all employees in the EMS process. Therefore, we improved communications between ALL levels of staff in our wastewater facility.*

Beth Eckert
Gastonia, North Carolina
Public Works and Utilities Department

Step 6) Check the Communication Procedure(s) for EMS Conformance

After you have documented and implemented your communications procedure it's time to check if it's actually working according to your plan and establishing the necessary communication channels. Here are some questions to investigate:

Check ✓

1. Who are the key interested parties and how were they identified?

2. What are the key concerns of our defined interested parties?

3. Do employees know their roles and responsibilities for ensuring solid communication?

4. Are employees aware of procedures and operational changes that affect their daily activities?

5. Can employees relate, in their own words, how their job functions connect to the Environmental Policy? Significant Aspects? Objectives and Targets?

6. Can employees who need necessary information access it easily? What processes do we utilize to respond to internal inquiries, concerns, and suggestions?

7. Have EMS requirements been communicated and understood by the employees and contractors that need to know?

> *We felt that getting the word out about our EMS would help our public image, which was one of the reasons we wanted to develop the EMS. The easiest way to do that was to put information about our EMS program on our Website.*
>
> Jim Newton, P.E., DEE
> Kent County, Delaware
> Levy Court Public Works

Three Keys to Success

(from wastewater facilities):

1. Try using creative methods to communicate your EMS message. For example, in an effort to educate outside stakeholders and reward employees, Jefferson County, Alabama sponsored an EMS event at a minor league baseball game. 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 your EMS policy or a summary of your policy on mouse pads, coffee mugs, magnets, business cards, tee shirts, etc.

2. In communicating with your 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 requirement and how it applies to each person's job.

3. Get the word out on the EMS! Communication of your EMS (e.g., policy, cost benefits, objective and target performance, status of your EMPs, etc.) with internal and external stakeholders is key to obtain buy-in from employees and maintaining external stakeholder support.

Internal and External Communication
(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- ❍ Define and implement a procedure for identifying and communicating with internal and external interested parties regarding your EMS process and environmental management activities and approaches.

The **Results** of this EMS requirement are:
- ❍ An approved procedure(s) (EMS Document) for internal and external communication.
- ❍ A record of communications (EMS Record) with external interested parties.
- ❍ A record of your decision (EMS Record) on ways to communicate significant aspects to external interested parties.

Before you Begin this EMS element:
- ❍ Complete your significant environmental aspects analysis.
- ❍ Identify what and how you currently communicate both internally and externally.

ISO 14001 Requirements	Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Communication With regard to its environmental aspects and environmental management system, the organization shall establish and maintain procedures for: a) internal communication between the various levels and functions of the organization; and b) receiving, documenting, and responding to relevant communication from external interested parties. The organization shall consider processes for external communication on its significant environmental aspects and record its decision.	**Environmental Policy -** Your Policy must be communicated to all employees and made available to the public. **Environmental Aspects -** Employees are aware of their roles and responsibilities in relation to environmental aspects. Processes for external communication are considered and decisions recorded. **Objectives & Targets -** Communicate with employees in areas and operations with environmental targets so that they understand their roles and responsibilities. **Structure and Responsibility -** Roles, responsibilities, and authorities shall be defined, documented, and communicated. **Training & Awareness -** Employees are aware of their roles and responsibilities in relation to environmental aspects and the potential consequences of departure from specified procedures.	Communications Procedure(s) Record of External Communications Record of decision on communicating significant aspects to external interested parties	List of Internal and External Interested Parties

Section 3: EMS Documents and Records

The EMS documents are written procedures, policies, work instructions, manuals, etc. used to keep your EMS working and functioning as you planned and intended. EMS documents describe your organization's daily EMS tasks and how they are accomplished. EMS documentation ensures that activities and operations are consistent through the use of up-to-date procedures and work instructions. Example EMS documents could include your aspect analysis system procedure, your environmental policy statement, your emergency response plan, or a work instruction on shutting down your air compressors in case of an emergency.

EMS records, on the other hand, present objective evidence, or proof, that your organization is following EMS procedures, policies, work instructions, and manuals, etc., as intended. Examples include training records, audit checklists, your list of significant aspects, and management review meeting notes.

To ensure that your employees work from the most current procedures, work instructions, and manuals, controlling your documents becomes very important. In addition, both documentation and records will help you explain your processes to auditors and other external interested parties, as well as allow your organization to effectively preserve institutional knowledge that would otherwise stay "between the ears" of your personnel.

Step-by-Step Guide to Controlling Documents and Records

Step 1) Assess EMS Document Control and Records Requirements

Step 2) Review Current Document Control and Records Procedures

Step 3) Integrate/Develop a System Procedure(s) for EMS Documents and Records

Step 4) Check Your Documents and Records for EMS Conformance

Step 1) Assess EMS Document Control and Records Requirements

From the beginning of your EMS implementation, you will be creating EMS system procedures and other documents of your processes that you will use to manage your EMS and meet EMS requirements. System procedures provide the basis for your EMS, and although it takes some time to create EMS procedures at the early stages of implementation, don't fret! Once in place, your EMS documents simply need to be periodically reviewed and modified as necessary to keep them current.

EMS Required System Procedures

- Environmental Aspects
- Legal and Other Requirements
- Communication
- Document Control
- Operational Control (for Significant Aspects)
- Emergency Response
- Nonconformance and Corrective and Preventative Action
- Records

Other Commonly Produced EMS Procedures

- Objectives and Targets
- Environmental Management Programs
- Management Review

Other Typical EMS Documentation

- Maintenance Manuals
- Work Instructions
- Contractor Contact Information
- Contracts
- Permits and Related Guidance Material

Example EMS Records

- Training Records
- Delivery Logs/Bills
- Calibration Results
- Audit Reports and Checklists
- A List of Your Significant Aspects
- Management Review
- Meeting Notes

In addition to EMS system procedures, your organization will rely upon other documentation specific to operations and services. This documentation (e.g., work instructions, maintenance manuals, etc.) will be referenced in your EMS system procedures and your EMS Manual and is used to instruct employees on how to execute specific tasks. Examples include a work instruction for calibrating a pH meter and a manual for maintaining your air compressors.

EMS Records

EMS records are a direct result of your EMS procedures and activities and demonstrate that your organization is doing what the EMS documentation says you are doing.

Your EMS records should be traceable to and identified with an activity or operation, maintained for review, and disposed of if no longer applicable.

NOTE

In order to meet EMS requirements, maintain EMS records including EMS Awareness Training, EMS Audit Checklists, a Significant Aspect List, etc. However, do not forget about maintaining records related to your environmental aspects. For example, an air permit or a calibration record, if in areas that can lead to significant impacts, need to be tracked and maintained as EMS records and available for your EMS auditors review.

Step 2) Review Current Document Control and Records Procedures

Once you have taken a look at the EMS requirements for maintaining your EMS documents and records, review what procedures/systems you have in place to meet the requirements and those that will work best for your wastewater facility.

- Will a paper or electronic process, or maybe a combination of both, work best?
- Who has the responsibility and authority for creating and revising documents?
- Which documents should be controlled and how do you ensure that employees refer to the correct versions?
- Does your organization currently employ a standard document format and numbering system?
- Does the current system meet EMS requirements?

Step 3) Integrate/Develop a System Procedure(s) for EMS Documents and Records

When you're satisfied that your process for managing and controlling your documents and records conforms to the EMS requirements, integrate that process with your current systems or document both processes in a system procedure.

Your team should develop an EMS system procedure for Document Control that ensures documents are:

● Easily located
● Periodically reviewed
● Readily available to personnel that need them
● Removed immediately if obsolete and replaced with current versions.

In addition, your procedure must clearly identify who is responsible for preparing documents, making necessary changes, and ensuring that documents are kept current. In other words, your organization needs a clearly defined system that designates authority for review and approval of documentation at various levels.

For samples of Document Control and Records procedure(s) from wastewater facilities, see Appendix A.

> ### COACH'S CORNER
>
> Many wastewater 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 your facility.

Step 4) Check Your Documents and Records for EMS Conformance

About two or three months after you have documented and implemented your Document Control and Records Management procedure(s) check and see if the procedure(s) is working according to your plan. Here are some questions to investigate:

Document Control Check ✓

1) Are the document control and record management procedures being followed in practice?

2) How do you verify that current versions of documents/procedures are being used?

3) Are your documents legible and dated?

4) Do you have a process to remove obsolete documents?

Policy

EMS Manual

Procedures

Work Instructions, Forms, Drawings, etc.

A **Document Control and Records Management system procedure**(s) is required for this element. A system procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed for this element.

Three Keys to Success

(from wastewater facilities):

1. Prepare a document control index that shows all of your EMS documents and the history of their revision. Include the index (or master list) in your EMS Manual.

2. If your wastewater organization uses computers extensively, consider using an electronic EMS document and records management system. This can help you manage and track changes. See the PEER Center (www.peercenter.net) for a survey of available EMS software.

3. Clearly explain the difference between EMS documents and records and how they are managed.

Three Lessons Learned

(from wastewater facilities):

1. Develop a document management system early in the EMS implementation so that EMS documentation will be immediately managed. Use your existing document format and control system if you have one.

2. Create a file folder on your Intranet that will house and control the most current versions (and change history) of your 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.

3. Establish a records retention policy and stick to it. Consider what is required for your compliance obligations.

Three Things to Avoid

(from wastewater facilities):

1. Creating an EMS Manual that is too lengthy. Keep your manual to no more than 1/2 to 1 page per EMS system element. Remember, easy to understand and to the point equals easy to implement.

2. Not establishing clear procedures on who can generate and make changes to your EMS and environmental documents. Limiting access and control of documents will make tracking and updating them easier.

3. Collecting and maintaining EMS records that do not add value. If records have no value or are not specifically required, don't collect them. Start with compliance records and records that you use to track your objectives and targets and significant aspects.

Records Management Check ✓

1) Have you identified what EMS records need to be maintained?

2) Have you determined the period of time necessary for retaining your environmental records?

3) How are your records stored and retrieved (electronic vs. hard copy)?

4) Are you maintaining all the records as required for your EMS?

5) Are records easily accessible?

The EMS Manual (ISO 14001, 4.4.4)

It is recommended that you maintain a summary of your EMS that:

- ◆ Describes the basics of your system's 17 core elements (and how the elements relate to each other), and
- ◆ Provides where you can find related documentation.

An EMS Manual or "roadmap" summarizes how the pieces of your EMS fit together and can be a very useful tool. Think of it as your EMS's roadmap to all 17 EMS elements.

For a sample EMS Manual from a wastewater facility, see Appendix A.

COACH'S CORNER

An EMS Manual is a great tool for your internal and 3rd-party auditors to follow to determine what your system looks like and how all your 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 your system.

NOTE

Under an ISO 14001-based EMS, maintaining "control" of your documents means that your EMS procedures, work instructions, manuals, and policies, etc. are managed to ensure that they are reviewed, current, dated, legible, and removed from circulation if they are out of date. For an example of what to look for to ensure that a document is controlled, take a look at the sample page at the end of this section. The circled areas demonstrate that the document is assigned, reviewed, and kept current.

Document Control and Records Management

(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- Write or modify your document control procedures to ensure documents are managed and kept up to date.
- Write or modify your records management procedures to ensure that all records are tracked and maintained.

The **Results** of this EMS element are:
- A document control procedure (EMS Document) for assuring that EMS procedures, work instructions, manuals, and policies are available at locations where they apply; and that they are periodically reviewed, are current, accurate, complete, and effective.
- A records management system (EMS Document) for assuring that all records required to support your organization's EMS are identified, controlled and accessible.

Before you Begin this EMS element:
- Consider your organization's current document and records management control procedures and tools.

ISO 14001 Requirements	Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Document Control The organization shall establish and maintain a procedure for controlling all documents required by this International Standard to ensure that a) They can be located; b) They are periodically reviewed, revised as necessary and approved for adequacy by authorized personnel; c) The current versions of relevant documents are available at all locations where operations essential to the effective functioning of the environmental management system are performed; d) Obsolete documents are promptly removed from all points of issue and points of use, or otherwise assured against unintended use; and e) Any obsolete documents retained for legal and/or knowledge preservation purposes are suitably identified. Documentation shall be legible, dated (with dates of revision) and readily identifiable, maintained in an orderly manner and retained for a specified period. Procedures and responsibilities shall be established and maintained concerning the creation and modification of the various types of document.	Demonstrate document control on EMS required and recommended procedures, work instructions, manuals, policies, etc.).	Document Control Procedure	Master List of Documents

ISO 14001 Requirements	Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Records The organization shall establish and maintain procedures for the identification, maintenance and disposition of environmental records. These records shall include training records and the results of audits and reviews. Environmental records shall be legible, identifiable and traceable to the activity, product or service involved. Environmental records shall be stored and maintained in such a way that they are readily retrievable and protected against damage, deterioration or loss. Their retention times shall be established and recorded. Records shall be maintained, as appropriate to the system and to the organization, to demonstrate conformance to the requirements of this International Standard.	A number of EMS elements will generate environmental records that need to be tracked and maintained, including: 1) Training 2) Communication 3) Monitoring and Measuring 4) Nonconformance and Corrective and Preventative Actions 5) EMS Audits	Records Management Procedure	Master Records List

City of Gastonia	Standard Operating Procedure - EMS-0100.002 Name: EMS Document Control Procedure	Corresponding Requirements: ISO Standard: 4.4.5 EMS Manual: 4.4.5 NBP Element: 12
Wastewater Treatment	Prepared By: Beth Eckert, Environmental/Administrative Manager	Revision #: 7 Revision Date: 5/12/03
	Approved By: Beth Eckert, Environmental /Administrative Manager *Signature*:	Effective Date: 1/1/00 Page 1 of 1

Demonstrates EMS Document Control

EMS Document Control
Standard Operating Procedure

1.0 Purpose

1.1 The following procedure covers the various requirements for control of existing documents and development of new documents.

2.0 Associated Equipment

2.1 None

3.0 Associated Reference Material

3.1 ISO 14001 Standard: ANSI/ISO 14001-1996 Environmental management systems - Specifications with guidance for use

3.2 National Biosolids Partnership - Elements of an Environmental Management System for Biosolids

3.3 EMS Document Control Checklist - EMS-0101.002A

3.4 City of Gastonia: Environmental Management System Manual - EMS-0100.000

3.5 Crowders Creek Operations Document Control Matrix: WCR-0101.000

3.6 Long Creek Operations Document Control Matrix: WLC-0101.000

3.7 Long Creek Laboratory Document Control Matrix: WLC-0101.100

3.8 Crowders Creek Laboratory Document Control Matrix: WCR-0101.000

3.9 Pretreatment Document Control Matrix: WPR-0101.000

3.10 Resource Recovery Farm/Biosolids Document Control Matrix: WRF-0101.000

3.11 Procedure template located in the EMS & Divisionwide directory of the read-only drive on the computer network. (Should be used as a guide in procedure development).

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Section 3: Operational Control

An EMS is about "managing" or controlling your facility's environmental impacts and, in particular, operations and services from which your identified significant environmental impacts, objectives and targets, and regulatory requirements are derived. What is operational control and how do you document it? You probably already have procedures, work instructions, permits, maintenance manuals, and similar in place for many of your operations and services. In other words, documents, processes, and programs are in place for how you do a particular job or operation, who is responsible, etc. This shows control and management of an operation or service.

The following steps will allow your organization to determine which operations or services should be covered by documented procedures and work instructions and how those operations should be controlled.

Step-by-Step Guide to Establishing Operational Control

Step 1) Identify Significant Environmental Operations

Step 2) Review and Draft Operational Controls

Step 3) Review Maintenance and Calibration Requirements

Step 4) Check Operational Controls for EMS Conformance

Step 5) Communicate Operational Controls

Step 1) Identify Significant Environmental Operations

Determining which operations should be covered by documented operational controls and how those operations should be controlled is an important step in developing your EMS. Review the operations and services that are related to your significant aspects and objectives and targets that you identified earlier. Now review your regulatory requirements in these areas.

Is it clear to your employees how you want these activities to be conducted and controlled? In other words, do these activities have manuals, procedures, work instructions, and similar documents and instructions to manage how their day-to-day tasks are accomplished?

Keep in mind that you might need documented operational controls in order to manage significant aspects and legal requirements, regardless of whether you established objectives and targets for each of them.

Key Section Terms
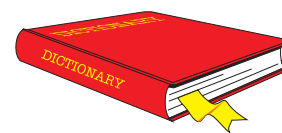
Operational Controls – Documents that specify the way to execute a certain activity or operation. Operational controls are assigned to operations and services involving significant aspects and are documented through the use of work instructions, procedures, manuals, programs, etc. Examples include maintenance work, pretreatment operations, chemical ordering, etc.

System Procedure – An EMS – (ISO 14001) required document that establishes purpose, scope, roles & responsibilities, the tasks to be completed, and where and how the associated records and documents are maintained.

Work Instruction – A series of steps and activities directed to a very specific area or process. Examples include cleaning the rake at wastewater pretreatment operations and calibrating a pH meter.

Three Lessons Learned

(from wastewater facilities):

1. The most effective operational controls are short and to the point. Several examples from wastewater facilities are included in the appendices of this Handbook.

2. 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 your organization's environmental performance significantly.

3. Use photos and diagrams where applicable for your operational controls. For example, a diagram showing the direction and how far to turn a valve is much clearer than text.

Step 2) Review and Draft Operational Controls

Once you have a list of operations and services that require documented operational controls, take a look at what you already have in place to manage these activities. Do your current procedures reflect what is actually being done at your wastewater facility? How do you control the operations now and are the controls adequate? Can the employees, whose work the procedures describe, easily understand them?

If you have documented operational control procedures already in place for your significant activities—great! Reference and document them in your EMS Manual (see EMS Documents and Records later in this section). If not, you will need to add language to current procedures and/or draft new procedures to ensure adequate control of your significant environmental operations, legal requirements and your objectives and targets.

For an example of an Operational Control Procedure, see Appendix A.

Step 3) Review Maintenance and Calibration Requirements

Maintenance and calibration of equipment in areas that could have significant environmental impact must be considered for your wastewater EMS. Once you have identified operations that require control and have documented your procedures and work instructions for these, determine the maintenance and calibration requirements for these operations and services and document and maintain these records. Don't ignore the maintenance manuals that come with your equipment.

Some organizations place critical monitoring equipment under a special calibration and preventive maintenance program. This can help to ensure accurate monitoring and make your employees aware of which instruments are most critical for environmental monitoring purposes.

> *After you have identified your significant environmental aspects, there are two separate paths to follow (a fork in the road). The first is setting your objectives and targets and then developing environmental management programs to achieve your targets. The second path is to ensure that you have or develop operational controls to deal with any other significant aspects you have identified that may not be covered under your current objectives and targets and the associated programs to meet them.*
>
> Donna Adams
> Eugene, Oregon
> Wastewater Division

Step 4) Check Operational Controls for EMS Conformance

About two or three months after you have documented and implemented your Operational Controls procedures, check if they are working according to your plan. Here are some questions to investigate:

Check ✓

1. Have you identified all operations and activities associated with significant environmental aspects, legal requirements and environmental objectives & targets?

2. Are these operations and activities under control through programs, documented procedures, work instructions, etc.?

3. Have you communicated and trained your employees, suppliers, vendors, and contractors on applicable procedures, work instructions, and policies?

Step 5) Communicate Operational Controls

Review your documented procedures and work instructions (controls) with all applicable employees. Communicating your procedures with the people who will need to implement them will help secure their input. Also remember to communicate operational controls with applicable vendors, contractors, suppliers and temporary staff.

NOTE

Operational control is demonstrated and can be communicated through other EMS elements, including training, communication, document control, records management, and emergency preparedness and response. Use your current procedures, work instructions, and manuals relevant to these elements as ways to demonstrate control.

> *Initially, establish control for all your identified significant aspects. Then, establish controls for all your aspects and activities. This will bring consistency and accountability to those on your frontline who are ensuring environmental stewardship.*
>
> Rick Bickerstaff
> Charleston, South Carolina
> Commissioners of Public Works

Three Keys to Success

(from wastewater facilities):

1. Check in with all of your shifts and satellite offices for improvement suggestions, to test your procedures and to get involvement and buy-in to the EMS. If changes are made to procedures, make sure affected personnel are communicated with and trained accordingly.

2. Keep the language in your procedures and work instructions clear and simple. A good check is to ask someone unfamiliar with the activity if he/she could complete the work using the instructions provided.

3. Start by looking at the significant environmental aspects and legal requirements that you identified in Phase 1. Identify the operations and services that are related and then consider what types of controls are needed to manage these environmental aspects and compliance requirements.

Examples of Operations and Services that may Require Operational Controls:

- Management/disposal of wastes
- Approval of new chemicals
- Storage & handling of raw materials and chemicals
- Equipment maintenance & servicing
- Wastewater pretreatment
- Management of contractors

Operational Control
(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- Define and implement a procedure for controlling (procedures, work instructions, manuals, etc.) the significant operations and services, objectives and targets, and compliance requirements of your organization.

The **Results** of this EMS element are:
- Documented methods to control (e.g., procedures, work instructions, maintenance manuals, etc.) operations and services that affect your facility's significant environmental aspects, objectives and targets, and compliance requirements.

Before you Begin this EMS element:
- Complete your significant environmental aspects analysis.

ISO 14001 Requirements	Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Operational Control The organization shall identify those operations and activities that are associated with the identified significant environmental aspects in line with its policy, objectives and targets. The organization shall plan these activities, including maintenance, in order to ensure that they are carried out under specified conditions by: a) Establishing and maintaining documented procedures to cover situations where their absence could lead to deviations from the environmental policy and the objectives and targets; b) Stipulating operating criteria in the procedure; c) Establishing and maintaining procedures related to the identifiable significant environmental aspects of goods and services used by the organization and communicating relevant procedures and requirements to suppliers and contractors.	**Policy -** To satisfy the commitments made in your environmental policy, operations and activities must be controlled. **Environmental Aspects -** Identified significant environmental aspects must have documented procedures (i.e., controls) in place. **Legal and Other Requirements -** Regulated operations must have documented procedures (i.e., controls) in place. **Objectives and Targets -** The environmental goals set by your organization must have documented procedures (i.e., controls) in place. **Training -** Training is required for employees, vendors, service providers, and contractors that could significantly affect the environment. **Monitoring and Measurement -** Equipment in potentially significant areas must be properly maintained and calibrated.	Documented operational controls (e.g., procedures, work instructions, manuals, etc.) for significant aspects and areas and for your objectives and targets.	A list of operations and services related to your significant environmental aspects, objectives and targets, and compliance programs.

Section 3: Emergency Preparedness and Response

E ven in the best-managed facilities, accidents and emergency situations can and do occur. Today's post 9/11 threats and realities require that facilities remain vigilant and prepare for an entirely new variety of changing pressures and risks. Under the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, many local utilities are now required by the U.S. Environmental Protection Agency to conduct **vulnerability assessments** and to certify that updated emergency response plans exist. The EMS process offers enormous potential for water providers to proactively identify and successfully manage environmental as well as security risks and vulnerabilities.

The intent of the EMS Emergency Preparedness and Response element is to ensure that effective plans for preparing for and responding to emergencies are available, easily accessible, and clearly understood by everyone that might need them.

Emergency response is fundamentally integrated into everyday operations, activities, and services, guiding an organization to continuously improve the management of their risks and threats over a short and long-term basis. The ultimate goal is to protect employees and the community, to prevent and minimize environmental impacts, and to reduce operational damage. Those wastewater and drinking water utilities who have conducted vulnerability assessments will find that this point in the EMS process is also a great place to incorporate plans for ensuring the security of their facilities.

Step-by-Step Guide to Emergency Preparedness and Response

Step 1) Identify Existing Emergency Plans and/or Procedures

Step 2) Identify Potential Accident and Emergency Scenarios

Step 3) Define How Your Organization Can Prevent Emergency Incidents and Mitigate Impacts

Step 4) Develop EMS System Procedures/Plans for Emergency Preparedness and Response

Step 5) Check Your Procedures/Plans to Ensure Conformance to EMS Requirements
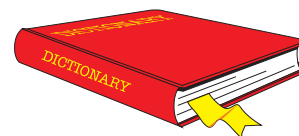
Key Section Terms

Emergency Situation – Condition (e.g., 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.

The Public Health Security and Bioterrorism Preparedness and Response Act of 2002 - Federal requirements for public water and wastewater utilities to conduct a vulnerability assessment and to certify to the U.S. EPA that emergency response plans have incorporated the assessment information and have been fully integrated into their operations.

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 (e.g., vandalism, insider sabotage, terrorist attack, etc.). For more information please see the Vulnerability Assessment Fact Sheet.

- Police

- Local Emergency Responders

- Fire Department

- Medical Services

- Internal Emergency Coordinator(s)

Three Keys to Success

(from wastewater facilities):

1. Evaluate the effectiveness of your 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.

2. 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.

3. Evaluate the effectiveness of your emergency response procedures/plans and vulnerability assessments on a regular basis (at least annually). Consider using your wastewater staff in your emergency and security drills as part of their training program.

NOTE

Emergency preparedness and response is a heavily regulated area for wastewater facilities. The importance of this EMS element should be communicated and trained to all employees and contractors.

In order to fulfill EMS requirements, you need to establish and implement procedures that describe how your organization:

1. Identifies potential for and responds to accidents and emergency situations;
2. Prevents and mitigates the environmental impacts that may be associated with them;
3. Reviews and revises, where necessary, emergency preparedness and response procedures after the occurrence of accidents and emergency situations; and,
4. Periodically tests such procedures where practicable.

Step 1) Identify Existing Emergency Plans and/or Procedures

Most organizations will find that they already have a number of emergency response plans in place. For example, most wastewater facilities must have Spill Prevention, Control, and Countermeasure (SPCC) plans in place. Sticking with the Keep It Simple, Simple (KISS) rule, review what you already have in place first and evaluate how they address the EMS requirements. Your emergency and response procedures/plans ensure that potential accidents and emergency situations are identified, avoided, and mitigated if they do occur. By all means, if you have plans in place that work, keep them and build from them to develop a comprehensive approach.

In reviewing your existing emergency plans, consider:

✓ Are the plans current?
✓ Have contact information or telephone numbers changed?
✓ When was the last time we tested them?
✓ Is training adequate and up-to-date?
✓ Are new and temporary employees being trained?
✓ Are there gaps between what is in place and what the EMS requires?

NOTE

Review previous spills and other emergencies and your responses as a guide to where future accidents or incidents could occur and be prevented. Take the lessons learned from previous emergencies to review if your plans are effective.

Step 2) Identify Potential Accident and Emergency Scenarios

When you have reviewed your existing emergency preparedness and response plans, take a moment to brainstorm potential emergency situations that could arise from your organization's everyday activities and operations. You may also want to consider the potential risks from accidents and/or hostile acts. Your EMS can help ensure that your employees are adequately prepared for potential scenarios, including security risks.

NOTE

FIRST RESPONDERS

More often than not, frontline (i.e., shop floor) employees will be the first responders to an incident and must know what procedures to take to manage potential emergency scenarios effectively.

Remember, your organization's response plans may overlap (i.e., who to call, who to report to, etc.) for a number of emergency situations. It's good to ensure that personnel know exactly what to do in each different situation. In addition, if you have already conducted a vulnerability assessment to identify your security risks, you may want to include this information in your emergency plans as well.

COACH'S CORNER

Communicate with local officials (fire department, hospital, etc.) about potential emergencies at your wastewater facility and how they can support your 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 your plans/procedures.

Three Things to Avoid

(from wastewater facilities):

1. Not inviting local emergency response agencies into your facility for emergency reviews and drills. Local responders need to know the layout and any changes to operations of your facility. In addition, response agencies can assist you in developing and updating your response plans.

2. Thinking only about response – focus on how to prevent accidents and emergencies in the first place.

3. Starting your emergency preparedness and response procedures/plans from scratch. Build on what you currently have in place for responding to emergencies and accidents.

Incident reviews give an organization the opportunity to step back and evaluate what went right and what went wrong after an emergency situation. These reviews facilitate positive change and continual improvement.

Rick Bickerstaff
Charleston, South Carolina
Commissioners of Public Works

Policy

EMS Manual

Procedures

Work Instructions, Forms, Drawings, etc.
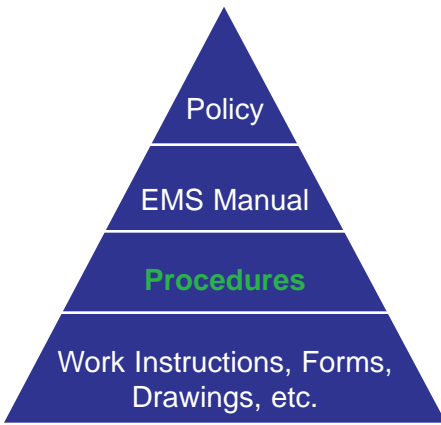
*Emergency Preparedness and Response **Procedures/Plans** are required for this element. A system procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed for this element.*

"Focus on both internal and external response criteria. Team build with local and state emergency response agencies. Coordinate exercises involving both employees and external agencies together. This tests the response of both parties and promotes team work. In addition, conduct bi-annual drills (or more frequent) to test your system."

James Naber
Buncombe County, North Carolina
Metropolitan Sewer District

Step 3) Define How Your Organization Can Prevent Emergency Incidents and Mitigate Impacts

As your facility puts this EMS element in place, focus on emergency response and do not overlook and forget that accident prevention is equally important. Spend time looking at ways to prevent environmental accidents in the first place. However, emergencies still happen in the best planned and managed operations. Therefore, ask:

How can we mitigate the potential impacts of these situations?
Are there adequate controls in place now?

Step 4) Develop EMS System Procedures/Plans for Emergency Preparedness and Response

Being prepared for emergencies means that you have identified all potential emergency situations that could arise, and have developed, put in place, and tested emergency response procedures.

Effective emergency preparedness and response plans are a core element of an EMS. They should be readily available, easily accessible, and clearly understood by everyone who might need them. From a practical perspective, your plans should include up-to-date emergency contact information, including current contact names (POCs) and current phone numbers. Make this information available **throughout** your facility, especially in areas where there is potential for accidents and emergencies.

Your emergency response procedures/plans should include actions that will minimize any environmental impact that could occur as a result of an accident, emergency or threat (e.g., in the case of security plans, this might include alternative water supply secured, public notice created and ready for immediate distribution, etc.).

COACH'S CORNER

A systems approach can successfully integrate environmental and security considerations into everyday business operations. Roles and responsibilities are defined based upon activities related to your priority risks and vulnerabilities, empowering employees to analyze, control, and mitigate impacts related to their daily work. These designations can also be utilized to control and monitor access to critical areas and processes within a facility that relate to operations identified in vulnerability assessments. In essence, employees throughout an organization take on a real sense of ownership for emergency response in their daily responsibilities and within the organization as a whole.

Your EMS leadership team will periodically review your emergency response plans and verify that they are realistic operationally, environmentally, technologically, and financially, and in the case of security response plans, that they meet any regulatory requirements imposed under the Public Health Security and Bioterrorism Preparedness and Response Act of 2002.

For samples of emergency preparedness and response procedures from wastewater facilities, see Appendix A.

NOTE

FIRST RESPONDERS

Each organization should test their emergency response plans regularly in order to verify their effectiveness, to apply lessons learned, and to apply any new technological enhancements.

Step 5) Check Your Emergency Procedures/Plans to Ensure Conformance to EMS Requirements

Check ✓

1. Have you reviewed environmental operations and activities for potential emergency situations?

2. Are personnel trained and aware of their roles and responsibilities during an emergency?

3. Do you conduct emergency drills and document the results?

REMEMBER

Don't think only about emergency **response**—focus on how you can **prevent** accidents in the first place by conducting drills, training, and communicating with local responders.

Look back at accidents and emergency situations that have occurred in the past. Are there any lessons learned or noticeable patterns?

Three Lessons Learned

(from wastewater facilities):

1. Be very clear on staff roles and responsibilities related to emergency prevention and response. For example, what do you do as a member of the response team versus as an employee that works in the laboratory or in the front office?

2. Be specific about who in your organization will conduct your 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 response agencies.

3. Post copies of your emergency plans (or at least critical contact names and phone numbers) around your facility, especially in areas where potential hazards exist. Include phone numbers for your on-site emergency coordinator, local fire department, local police, hospital, and rescue squad members as appropriate.

Involving Contractors and Temporary Staff

Make sure that contractors and temporary staff are communicated with and trained on their roles and responsibilities during an emergency. If they are the ones to first identify a spill or accident, do they know what phone number to call and what to do? This should be part of the basic training they are provided if they come on to your wastewater facility.

Water Security Legislation

EPA's Water Protection Task Force (WPTF) and Regional Offices, working with many partners, are taking actions to improve the security of the nation's drinking water and wastewater infrastructure in line with EPA's Strategic Plan for Homeland Security. Federal Legislation impacting water security includes the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Title IV), which amends the Safe Drinking Water Act and specifies required actions of community drinking water systems and the responsibilities of the U.S. EPA must take to improve the security of the nation's drinking water infrastructure.

For additional information, visit www.epa.gov/safewater/security.

U.S. EPA Water Emergency Response/Security Resources and Guidance Documents

Vulnerability Assessment Fact Sheet, produced by the U.S. EPA Office of Water in November 2002. Describes the purpose and six basic elements of vulnerability assessments to help water systems evaluate potential threats and identify corrective actions to prepare for and respond to an attack.

Instructions to Assist Community Water Systems in Complying with the Public Health Security and Bioterrorism Preparedness and Response Act, Produced by the U.S. EPA Office of Water in January 2003.

Protecting Your Community's Assets: A Guide for Small Wastewater Systems, Produced by the National Environmental Training Center for Small Communities.

Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems Serving Populations of 3,300 and 10,000, The guide was developed by the Association of State Drinking Water Administrators (ASDWA) and the National Rural Water Association (NRWA) in May 2002.

Model Emergency Response Guidelines, Produced by the U.S. EPA Office of Water in April 2002.

Water Information Sharing and Analysis Center (Water ISAC), Information service to provide water systems with a secure web-based environment for early warning of potential threats and a source of knowledge about water system security.

Checklist for Emergency Preparedness & Response

		Does your plan describe the following?
	X	Potential emergency situations (such as fires, explosions, spills or releases of hazardous materials, and natural disasters)?
	X	Hazardous materials used on-site (and their locations)?
	X	Key organizational responsibilities (including emergency coordinator)?
	X	Arrangements with local emergency support providers?
	X	Emergency response procedures, including emergency communication procedures?
	X	Locations and types of emergency response equipment?
	X	Maintenance of emergency response equipment?
	X	Training/testing of personnel, including the on-site emergency response team (if applicable)?
	X	Testing of alarm/public address systems?
	X	Evacuation routes and exits (map), and assembly points?

CASE STUDY
Security Management

Recently, a wastewater facility identified a large chemical storage area as a high priority (significant) environmental issue that it wanted to manage as part of its EMS. Using a parallel approach, the facility integrated its security issues into the Plan-Do-Check-Act system and identified the chemical storage tank as a high priority security risk as well. The facility's objective was to determine how to manage this environmental and security issue in an efficient and cost-effective way. Drawing on the experiences of employees up, down, and across the organization, and on best practices information and product substitutions gathered from a variety of state, trade association and federal web sources, the wastewater facility determined that product substitution could be a technologically realistic, operationally feasible, and cost-effective solution. Until the new product was fully implemented, trainers updated existing training with "need to know" environmental and security competency training for employees who worked with the chemical tanks and provided awareness training for others about the risks involved. This example shows how the plan-do-check-act process can work effectively for both environment and security (vulnerability) outcomes.

Case Study Example : Anytown, USA Water Plant
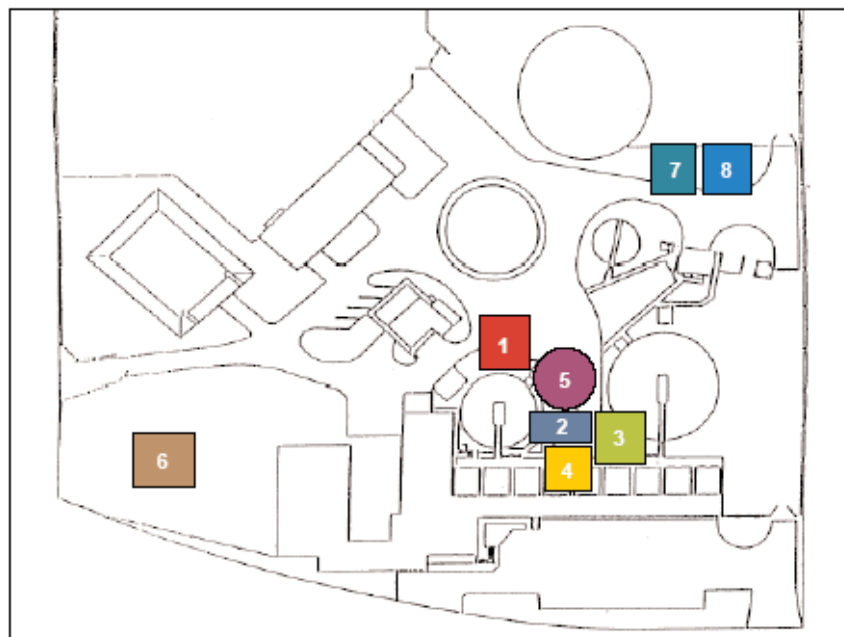
LEGEND
1. Chlorine Storage Shed
2. Anhydrous Ammonia Storage Tank
3. Hydrofluosilicic Acid Tank
4. Carbon Dioxide Storage Tank
5. Calcium Oxide Silo
6. Diesel Fuel (aux. generator)
7. Hydrochloric Acid Shed
8. Calcium Hypochorite Shed

Emergency Preparedness and Response
(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- ❍ Establish or modify emergency preparedness and response procedures/plans that address the potential for and response to accidents and emergency situations.

The **Result** of this EMS element is:
- ❍ Verification that your organization's emergency preparedness and response procedure(s)/plan(s) (EMS Document) are effective in relation to the significant environmental aspects and objectives and targets of your organization.

Before you Begin this EMS element:
- ❍ Complete your significant environmental aspects analysis.

ISO 14001 Requirements	Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Emergency Preparedness and Response The organization shall establish and maintain procedures to identify potential for and respond to accidents and emergency situations, and for preventing and mitigating the environmental impacts that may be associated with them. The organization shall review and revise, where necessary, its emergency preparedness and response procedures, in particular, after the occurrence of accidents or emergency situations. The organization shall also periodically test such procedures where practicable.	**Environmental Aspects -** Environmental aspects are reviewed for potential emergency situations. **Legal and Other Requirements -** Spills, fires, and other emergency events that are likely to have legal (e.g., reporting) requirements. **Training & Awareness -** Employees that respond to emergencies are trained and certified. **Communication -** All employees understand what they need to do in case of an emergency. **Document Control -** Emergency response procedures/plans are controlled so that the most recent version(s) are being utilized.	Emergency Procedures/Plans Records of Emergency Incidents, Training, and Drills	None

Phase IV: Checking & Corrective Action

You are now ready to begin the Checking and Corrective Action Phase of the EMS cycle. Each section of this Handbook will guide you step-by-step through each of the EMS activities. Refer to the icons for case studies, sample documents, keys to successes and other implementation assistance. At the end of each section, two handy reference sheets review the **Purpose** of each requirement, describe the **Results** you'll be developing, discuss how to **Prepare** to do the work, and show how the element links to other EMS requirements.
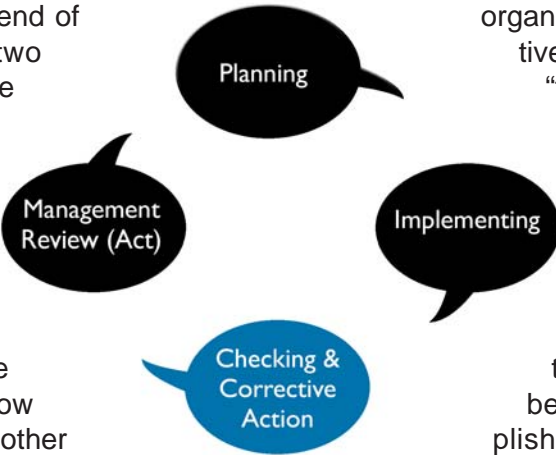
and functioning as you intended. The check, an EMS audit or review, is a tool that you will periodically use to identify any flaws or weaknesses in your EMS. This information can help you assess how well your EMS is performing and help your organization continually improve. As part of the audit process, your organization will take corrective actions on any EMS "findings" to make sure that nonconformances are examined for its root causes, corrected, and prevented from re-occurring. If you are using a two-year cycle, the activities in this phase can be comfortably accomplished in about five months.

In this phase, you will define and document methods that your organization will use to verify that your EMS is effective

Here's a checklist of requirements in this Phase:

Phase IV EMS Requirements (5 months)	
Monitoring and Measuring	✓
EMS Internal Auditing	✓
Nonconformance & Corrective/Preventative Action	✓

Section 3: Monitoring & Measurement
(Assessing how well your system is performing)

So far, you've identified your significant environmental aspects, set objectives and targets, and conducted a review of your operations and services to identify applicable regulatory and other requirements. You have also put procedures and work instructions (operational controls) in place to ensure that your environmental issues (i.e., significant aspects) are managed. The next step is to *monitor and measure* your progress in meeting your objectives and targets, and assess your compliance toward meeting your regulatory requirements.

Monitoring and measuring allows you to track your environmental performance and improve efficiency by managing what you do. Remember, you can't manage what you can't measure! The results of your objectives and targets and other environmental efforts are easier to demonstrate when current and reliable data are available and referenced against a defined baseline. These data can help you demonstrate the value of the EMS to top management, as well as to other interested parties such as your local community.

In this section you will develop ways to:

- Identify key characteristics of operations and activities that can have significant impact
- Track performance (including progress in achieving your objectives and targets)
- Monitor conformance with operational controls
- Calibrate and maintain monitoring equipment
- Periodically evaluate your compliance with applicable laws and regulations

Step-by-Step Guide for Monitoring and Measuring Your Key Environmental Activities

Step 1) Determine What You Currently Monitor and Measure

Step 2) Identify What You Need to Monitor and Measure to Determine How Your EMS is Performing

Step 3) Assess Compliance and Track Your Environmental Performance

Step 4) Develop an EMS System Procedure for Monitoring and Measurement

Step 5) Check Your Monitoring and Measurement Procedure for EMS Conformance

Step 6) Communicate Progress and Performance

Key Section Terms
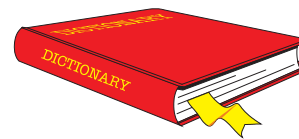
Baseline – The starting point from which the meeting of an objective is to be measured. Establish "normalized" baselines to accurately measure how your facility's environmental performance could change over time. Normalized baselines will measure your actual environmental performance changes rather than changes in production, customer demand, or other non-environmental related factors.

Environmental Aspect – Element of an organization's activities, products or services that can interact with the environment. Aspects = Causes

Environmental Management Program (EMP) – A structured program with a set of specific identifiable actions (an "action plan") providing the direction for EMS objectives and targets to be obtained and tracked. Your plan should assign tasks, resources, responsibilities, and timeframes for achieving your objectives and targets.

Environmental Objective – An overall environmental goal based on an established environmental policy, that an organization sets itself to achieve. Wherever possible, environmental objectives should be quantified to facilitate the evaluation of environmental performance and the measurement of progress towards specific environmental targets.

Environmental Target – A detailed performance requirement, quantified where practicable, that arises from the environmental objectives and that needs to be set and met in order for the objective to be achieved.

Key Section Terms, continued

Key Characteristic – An element of an operation or activity that can be measured or evaluated for environmental performance of objectives and targets.

Performance Indicators – Measurement tools, selected by management that can be used to support the evaluation of environmental performance in relation to a specific target. Performance indicators may be adjusted to meet specific management needs or as necessary to ensure progress towards specific environmental targets.

Three Keys to Success

(from wastewater facilities):

1. 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.

2. 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 your EMS.

3. Remember your external stakeholders (i.e., city commissioners, citizen groups, etc.) as you determine what to monitor and measure.

Step 1) Determine What You Currently Monitor and Measure

Examine your wastewater operations and services and determine what you are currently monitoring and measuring. Your environmental regulations are a good place to start, since these requirements typically include monitoring, measuring, (permit limits, etc.) and reporting components (Toxic Release Inventory (TRI), etc.). How well do these measurements serve your EMS purposes? What additional monitoring or measuring might be needed as your organization continues to move beyond compliance?

Step 2) Identify What You Need to Monitor and Measure to Determine How Your EMS is Performing

Your organization will track data and information, collected through your EMS on a continuing basis, to determine whether and how your wastewater facility is achieving its environmental objectives and targets and to properly manage your significant aspects. Information collected by monitoring and measuring your key environmental issues can help make this determination and answer the questions: Is your EMS being carried out as planned? Is your organization achieving its commitments and its objectives and targets? What information is most valuable?

To determine what you need to monitor and measure, identify wastewater operations and services that affect your environmental performance. What are the key characteristics of the operations, services and related equipment and how do you measure these characteristics to ensure proper performance?

Monitoring and measurement takes the pulse of an organization. Their application can be the most important tools in a manager's toolbox with regard to setting goals, objectives and targets, and improving overall operations.

Rick Bickerstaff
Charleston, South Carolina
Commissioners of Public Works

REMEMBER

Start by looking at what's regulated and then look at the significant aspects and objectives and targets that you identified earlier.

Let's review the sanitary sewer overflow (SSO) significant aspect example again and make a sample list of the operational controls, key characteristics, monitoring and measurement methods, and calibration needs for operating and maintaining wastewater pump stations.

Operation with Significant Environmental Aspect	Significant Aspect	Operational Controls	Key Characteristics of Operation or Activity	Monitoring or Measurement Methods	Equipment & System Calibration Needs
Operate and Maintain Pump Stations	Sewer System Overflows (SSOs)	◆Pump Maintenance Manual(s); ◆Work Instructions on Cleaning Sewer Mainlines; ◆Emergency Generator Operations and Maintenance	◆# of Alarms ◆ Flow per Capita ◆ # of Overflows ◆ # of Cleanings per Month	◆ Measure Quantities; ◆ Monitor Lift Stations; ◆ Census Data; ◆ Monthly Operating Reports	◆ Flow Meters; ◆ SCADA

NOTE

Environmental measurement can be a combination of process and outcome measures. In other words, you may want to consider measurements that assess "how" you are doing something as well as measurements for "what" is produced.

- **Outcome measures** look at **results** of a process or activity, such as the amount of waste generated or the number of spills.

- **Process measures** look at "**upstream**" factors, such as the number of employees trained on a topic.

Consider selecting a combination of process and outcome measures that are appropriate to your wastewater facility. For example, using the SSO significant aspect example above, an outcome measure would be the number of overflows per year and a process measure could be the number of cleaning or maintenance activities completed per month to prevent line blockage and that would consequently reduce the chance for an overflow event.

Step 3) Assess Compliance and Track Your Environmental Performance

An EMS requires you to periodically evaluate your compliance with applicable laws and regulations. In practice, most organizations go through some form of compliance audit and this can be done either by internal staff or by an outside organization. While the compliance audit is generally a way to determine if you are actually in compliance, you should also use it as a way of determining if your organization is well

A Word on Calibration

As part of meeting meeting your monitoring and measurement requirements, you will need to document calibration requirements and dates for equipment used in areas where you identified significant aspects, where you set objectives and targets, and in areas where you have compliance requirements. Example calibrated equipment could include gauges used to monitor stack air emissions or a pH meter used to measure effluent water quality. Make sure a regular schedule is in place to calibrate the equipment and make sure you retain your calibration records. Remember, some equipment may be calibrated off-site, so make sure the vendor supplies you with a copy of the records.

REMEMBER

Don't forget about the maintenance manuals that come with your equipment. They may contain calibration and/or measurement methods for your equipment. In addition, your equipment may have calibration procedures set by the manufacturer that must be followed.

Three Lessons Learned

(from wastewater facilities):

1. Start with a relatively simple monitoring and measurement process, looking at your legal requirements and significant aspects. It is OK to start small and build over time as you gain experience in evaluating your performance.

2. Select performance indicators that will provide the information you need to make effective decisions about your EMS.

3. Don't forget about on- and off-site contractors that calibrate and/or maintain equipment that is within your identified significant operations and services.

Three Things to Avoid

(from wastewater facilities):

1. Going out of your way to monitor and measure everything. Start with what is required by law and then examine your objectives and targets. Don't collect data for data's sake!

2. Not committing the necessary resources (human and dollars) to track performance information over time.

3. Not communicating the performance and progress of your objectives and targets to management and staff.

suited to address instances of noncompliance should they occur. In other words, are you able to effectively *manage* compliance as well as audit for it? When determining if you are effectively managing compliance, you should use this opportunity to make sure that proper procedures are in place to respond to instances of noncompliance, determine the root causes of noncompliance, and make any changes to your system to help ensure that the noncompliance does not recur. Effective compliance management is an essential part of an EMS.

Once you know what to measure and what indicators that you will use, assess and track your objectives and targets so you know how well they are performing. Remember to have regular checks on the progress of your objectives and targets and report the results to top management.

Remember to also assess and track your significant aspects. Keeping track of your significant aspects will let you know how well they are managed (being controlled) and also provide you with a baseline for potential future objectives and targets.

For example, have operational controls (procedures, work instructions, etc.) been documented for each of your significant aspects? Have employees been trained on any changes to emergency preparedness and response plans? Are your training records up to date and documented? Do employees whose work involves significant aspects understand their roles and responsibilities?

NOTE

What about issues that are not so easy to quantify? For example, better odor management in wastewater treatment plants, improved public image, and improved relationship with stakeholders? It takes some rather creative "indicators" to quantify these improvements. Talk to your peers in the wastewater industry to see how they measured these types of issues.

The top five performance indicators that the wastewater facilities that contributed to this Handbook used to monitor and measure their EMS performance are included below:

Wastewater Facility	Performance Indicator
Buncombe County, North Carolina	• Quarterly internal audits • Environmental compliance audits • Quarterly management review meetings • Monthly steering committee meetings • Monthly ISO Team meetings.
Charleston, South Carolina	• Random inspections to ensure conformance to standard operating procedures. • Monthly reporting of objectives & targets associated with continual improvement. • Regulatory monitoring is performed through established monitoring systems. Items are monitored on varied recurring cycles (each month to once every 3 years) depending on the regulatory requirements. • Employees are encouraged (with incentives) to fill out Corrective-Preventive Action Requests (CPARs). These requests provide opportunities for preventing pollution and improving operations. • Performance measurement is performed through our Productivity Measurement Program (PMP). Tasks are valued at certain levels based upon the length of time to accomplish with a specified manpower requirement. Incentives are provided for attaining set goals, and inter-departmental competition is also fostered.
Eugene, Oregon	• Regulatory compliance and reporting • Objectives and targets • Internal/external audits (EMS, compliance) • Training records (completion) • Document control (reviews and updates)
Gastonia, North Carolina	• Compliance • Internal audits (EMS and Compliance) • Public comments - Review of communications with external parties/customer satisfaction surveys • Communication and cooperation among staff and management • Costs and efficiencies particularly with regard to energy and chemical usage
San Diego, California	• Sanitary sewage overflow reduction • Targets and objectives tracking • Recycled material tracking • CPAR status • Standard operating procedures status

REMEMBER

Remember to track and record your EMS benefits, especially the ones realized from our objectives and targets. These will make an impression with management as you move forward with your EMS.

Policy

EMS Manual

Procedures

Work Instructions, Forms, Drawings, etc.
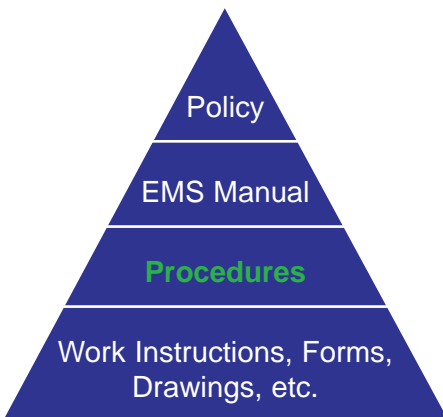
*A Monitoring and Measurement **system procedure** is required for this element. A system procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed for this element.*

NOTE

You can monitor and quantify other organizational benefits that the EMS brings, such as efficiency savings, reduced landfill costs from recycling efforts, and accidents/fines avoided, etc., when tracking your EMS performance.

Involving Contractors and Temporary Staff

It is important to involve contractors and temporary employees in this phase of your EMS, especially if they work in areas that can create a significant impact on the environment and/or monitor or maintain equipment for your significant aspects and/or objectives and targets. Communicate with and train contractors and temporary staff on their roles and responsibilities.

Step 4) Develop an EMS System Procedure for Monitoring and Measurement

When you're satisfied that your process for monitoring and measuring conforms to the EMS requirements, document the process in a system procedure. As with all EMS system procedures, it needs to clearly define what, who, when, how, and where.

For samples of Monitoring and Measurement procedures from wastewater facilities, see Appendix A.

REMEMBER

To be compliant with the requirements of ISO 14001, you also need to establish and maintain a documented procedure for evaluating compliance with environmental laws. You should have set up a Legal and Other Requirements procedure in your Planning Phase of the EMS.

Step 5) Check Your Monitoring and Measurement Procedure for EMS Conformance

Check to see if your procedure is working according to your plan. Here are some questions to investigate:

Check ✓

1. Have you identified operations and activities associated with significant environmental aspects, legal requirements and environmental objectives?
2. Have you completed a review of your legal compliance status?
3. Have you identified what needs to be monitored and measured?
4. Have you decided what performance indicators/metrics are appropriate?
5. Have you established a schedule for monitoring and measuring?
6. Have you reviewed what equipment needs to be maintained and calibrated?
7. Do you communicate performance information to management on a regular basis?

Step 6) Communicate Progress and Performance

Communicate and record the progress and performance of your objectives and targets to top management and to your staff. Management needs to know if resources are appropriate for what you want to accomplish and if you are on track with your environmental goals.

Remember, employees respond best to information that is meaningful to them. Putting environmental information in a form that is relevant to their function and work area increases the likelihood they will act on the information.

CASE STUDY
Eugene, Oregon Wastewater

"Paper Products Consumption"

To achieve the target of reducing overall paper goods consumption by 30%, we developed and implemented extensive facility-wide conservation, recycling, training, and purchasing programs.

We greatly exceeded our target, and actually reduced paper use by 50% total. We reduced janitorial paper use by 48%, and office paper use by 37%.

To achieve this substantial reduction, we implemented the following strategies:

• Provided easily accessible, shared information on alternative products (kitchen products, cornstarch plates and cups, etc.). We tested dish drying racks in the kitchens to reduce paper towel use, and we will use cloth towels for large events.
Installed cloth towel mechanisms in most restrooms, reducing paper use by 4.6 tons compared to 2002.

• Implemented an extensive employee awareness program, including equipment use training that emphasized waste reduction for printers, copiers and fax machines.

• Redesigned documentation to minimize paper waste, and use electronic distribution where possible. In addition, we are participating in the WADERS pilot project for regulatory electronic reporting, and transitioning to the maximum electronic reporting possible, resulting in a drastic reduction of office paper use.

2003 Savings from Reducing Paper Use by 7.6 Tons

- 129.2 trees
- 52842 gallons of water
- 3515 gallons of oil
- 4457 pounds of air pollution
- 23 cubic yards of landfill space
- 30988 KWh of electricity

• Developed procedures and purchasing guidelines that target reduced paper use and emphasize purchase of products with recycled content.

• Continued with our previous objective to purchase paper goods containing higher recycled content. We increased purchases of products with greater than 30% recycled content by weight from 97% to 98% from 2002.

Annual Paper Purchases per employee
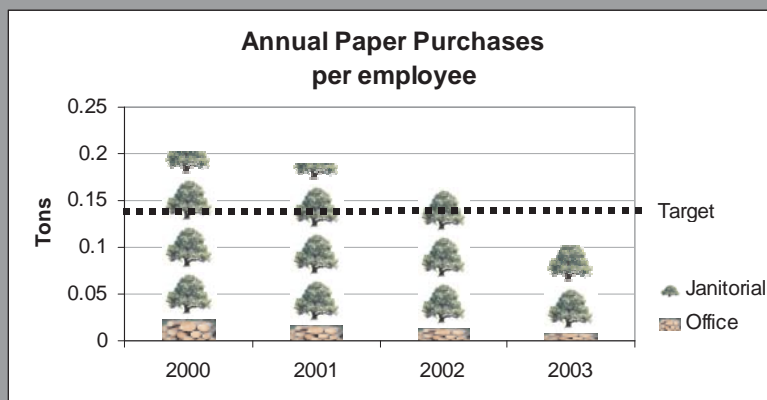
Monitoring and Measurement

(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- Monitor and measure the performance of your EMS, including your significant aspects, objectives and targets, legal compliance and operational controls.

The **Result** of this EMS element is:
- A procedure (EMS Document) to control monitoring and measurement activities that affect your significant environmental aspects and compliance requirements.

Before You Begin this EMS element:
- Complete your significant aspects and impacts analysis.

ISO 14001 Requirements	Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Monitoring and Measurement The organization shall establish and maintain documented procedures to monitor and measure, on a regular basis, the key characteristics of its operations and activities that can have a significant impact on the environment. This shall include the recording of information to track performance, relevant operational controls and conformance with the organization's environmental objectives and targets. Monitoring equipment shall be calibrated and maintained and records of this process shall be retained according to the organization's procedures. The organization shall establish and maintain a documented procedure for periodically evaluating compliance with relevant environmental legislation and regulations.	**Environmental Aspects -** Determining your significant aspects will identify the operations and services that you will need to monitor and measure. **Legal and Other Requirements** - A status check on compliance needs to be assessed and continually monitored. **Objectives & Targets -** Your environmental goals need to be tracked and measured to determine how well they are performing and meeting your intentions. **Operational Control -** Your significant aspects must have controls (procedures, work instructions, manuals, etc.) in place. **Management Review** - Top Management will review the progress and performance of your objectives and targets to help determine if you are on track and/or to see if resources are allocated appropriately.	Monitoring and Measurement Procedure Calibration Records	Calibration and Maintenance Procedure List of devices, location, calibration frequency and method, etc. Maintenance Manuals

Section 3: EMS Internal Auditing
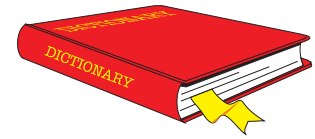
Once your organization has established its EMS, verify its effectiveness. The process of reviewing and verifying your EMS through an internal audit is critical and key to improving your system.

An EMS internal audit is a tool that your wastewater facility will use periodically to identify where things are working well and where improvements are needed. This information will help you assess how well your EMS is performing. The internal audit is a documented review of whether your organization is doing what it said it would do to manage its environmental issues and whether it is doing so effectively. An EMS internal audit is conducted by your organization's employees to determine your conformance with the ISO 14001 Standard.

NOTE

An EMS external audit is an EMS review conducted by an independent, third-party to determine EMS conformance, typically as means to seek third-party certification (see Section 4 for more information on third-party certification).

Your EMS internal audit is a snapshot in time. It evaluates your documents, procedures, and records and reviews their implementation effectiveness and consistency. The audit looks at your facility's planned activities for meeting its objectives and targets and controlling its significant aspects. It also looks for signs of management's commitment to the environmental policy and the EMS, and awareness and competency among all your wastewater employees.

Step-by-Step Guide to EMS Internal Auditing

Step 1) Select and Train EMS Internal Auditors
Step 2) Determine EMS Audit Scope and Frequency
Step 3) Prepare Staff for Your EMS Internal Audit
Step 4) Conduct an EMS Desktop Review
Step 5) Conduct an EMS Internal Audit
    a. Hold an Opening Meeting
    b. Audit for EMS Conformance
    c. Report EMS Audit Findings
Step 6) Develop a System Procedure for Conducting EMS Internal Audits
Step 7) Check the EMS Internal Audit Procedure for EMS Conformance

Key Section Terms

Audit Finding – A discovery of lack of conformance to the requirements of an (ISO 14001-based) 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.

Corrective Actions – As a result of the audit findings, corrective action reports (CARs) are assigned to all nonconformances to correct EMS deficiencies as they occur. CARs track an audit finding, assigning tasks to be completed, responsibilities, and timeframes.

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 your EMS.

EMS Auditor – A qualified and trained individual who conducts EMS audits. Each EMS Auditor should attend documented training that presents the requirements of a standard (e.g., ISO 14001) 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 your organization's EMS internal audits. The EMS Lead Auditor is the leader of your EMS audit team and will report audit findings and observations to management.

Key Section Terms, continued

Major Nonconformance – A deficiency in meeting the requirements of an EMS. One or more of the 17 elements of the EMS which are not addressed (e.g., no system procedure) or implemented (e.g., a number of employees are not aware that you have an Environmental Policy).

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 your system. (e.g., for example, a number of employees were overdue on their EMS refresher training.

Observation – A recognition of something done incorrectly or an area of concern. While not a major or minor nonconformance with an EMS requirement, if done correctly it could strengthen the EMS or if done incorrectly, could potentially cause a system failure. Remember to also document positive observations – things you are doing well.

System Procedure – An EMS (ISO 14001) required document that establishes purpose, scope, roles & responsibilities, the tasks to be completed, and where and how the associated records and documents are maintained.

> **NOTE**
>
> The size of a typical EMS audit team will vary depending on the size of your facility. It is recommended that you have at least two to three qualified members on your team. This will allow you to rotate your auditors to different areas and prevent scheduling conflicts when auditors are sick or on vacation.

Step 1) Select and Train EMS Internal Auditors

Your own qualified and trained employees are the best people to conduct an internal audit. If possible, train at least two people as EMS internal auditors, with one as the lead auditor. This will allow your auditors to work as a team. This also allows audits to take place when one auditor is unavailable.

Your auditors should be objective, and not audit his/her own areas of operation or service. For example, if your wastewater lab manager is one of your internal auditors, he/she should not be auditing your laboratory operations.

> **NOTE**
>
> Your EMS internal auditors require training in order to be effective reviewers of your system. Consider a three-day EMS Audit Overview or five-day EMS Lead Auditor training conducted by EMS training organizations in your area. For training, contact a certified Registrar Accreditation Board (RAB) commercial organization in your area (http://www.rabnet.com/ec_main.shtml). Also consult the Technical Assistance Providers (TAP) Directory or contact a Local Resource Center (LRC) in your region to find out if they offer EMS training for auditors. LRCs can be found on the PEER Center Website.

Step 2) Determine EMS Audit Scope and Frequency

Next, determine how often you want to conduct your internal audits and determine your audit scope. All programs and elements of your EMS should be audited every year. Audit your entire EMS at one time each year or break your review into specific elements for more frequent audits, where you would review a sampling of elements every quarter, but still audit all EMS elements within a year.

To determine the scope and frequency of your EMS internal audits, consider the environmental importance of the activities and the results of your previous audits. For example, you may want to focus audit efforts on significant aspect areas and activities or your objectives and targets, as well as on the findings from your previous EMS audits. This will direct your EMS audits to the most important areas for potential improvement.

> " *Conduct internal audits quarterly to simplify the audit process and to get a quarterly check up on how your EMS is working. These quarterly audits and their results can then be reviewed in a quarterly management review.* "
>
> James Naber
> Buncombe County, North Carolina
> Metropolitan Sewer District

A sample EMS audit scope and schedule is shown below. Review your entire EMS at least every year, beginning with a review of all EMS elements during your first internal audit. Then, consider conducting a sampling of EMS elements every quarter, as shown in the schedule below. Also, remember that your EMS internal audits can be integrated with other reviews you currently conduct (e.g., environmental, health and safety, quality, or security audits, etc.).

A Sample EMS Audit Scope and Schedule
(For an Example of Internal Audits Conducted Every Quarter)

ISO 14001:1996

		01/2005	04/2005	07/2005	10/2005	01/2006
4.2	Environmental Policy	*		*		*
4.3.1	Environmental Aspects	*	*	*	*	*
4.3.2	Legal and other Requirements	*		*		*
4.3.3	Objectives and Targets	*	*	*	*	*
4.3.4	Environmental Management Programs	*	*	*	*	*
4.4.1	Structure and Responsibility	*		*		*
4.4.2	Training, Awareness and Competence	*		*		*
4.4.3	Communication	*	*		*	
4.4.4	Environmental Management System Documentation	*	*		*	
4.4.5	Document Control	*		*		*
4.4.6	Operational Control	*	*	*	*	*
4.4.7	Emergency Preparedness and Response	*		*		*
4.5.1	Monitoring and Measurement	*	*		*	
4.5.2	Nonconformance & Correct/Prev Action	*	*	*	*	*
4.5.3	Records	*	*	*	*	*
4.5.4	EMS Audit	*		*		*
4.6	Management Review	*	*	*	*	*
	Previous Findings of Nonconformance	*	*	*	*	*

Three Lessons Learned

(from wastewater facilities):

1. Make "cheat sheets" for your employees. For example, post significant aspects and objectives and targets in work areas and have wallet cards made of your environmental policy so that employees do not have to memorize the EMS.

2. Work with your 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.

3. Establish a well-defined audit schedule and plan. Also, use an EMS checklist. These tools will effectively prepare your EMS auditor(s) and keep your audits consistent.

Three Things to Avoid

(from wastewater facilities):

1. Trying to be too "textbook" and/or using too much EMS jargon during the internal audits. Your internal auditors should take what they know and relate it to the activities that are being reviewed – then tie in the EMS requirement.

2. Not providing the necessary training for your internal auditors. Make sure your auditors understand the EMS and ISO 14001 requirements AND what you are trying to accomplish with your internal audits (i.e., environmental improvement).

3. Not preparing staff for your EMS Audits – all employees should understand what is expected of them during an EMS internal audit.

Step 3) Prepare Staff for Your EMS Internal Audit

You've developed an EMS internal audit scope and agreed on an audit schedule. You are ready to begin and so are your internal auditors. Your job as lead EMS auditor is to support the audit function by preparing your managers, employees, and all documents and records. All of these should be readily available to your audit team according to a pre-arranged audit schedule.

In advance of the audit, prepare management by:

▶ Reviewing their EMS responsibilities

▶ Rehearsing the type of questions that the auditor might ask (NSF Guide Second Addition, Appendix A, pages 153 - 156)

▶ Organizing and tracking corrective actions that the audit identifies.

▶ Indicating on managers' calendars suggested times for the pre-audit meeting to review the audit scope, plan and schedule, and the closing meeting to share audit findings

▶ Encouraging them to be visible, involved, and available for the month of preparation preceding the registration audit

Prepare employees by:

▶ Emphasizing the "find, fix, and prevent" opportunity the audit provides

▶ Reviewing the environmental policy and confirming the role it has in employees' daily activities

▶ Reviewing significant aspects, objectives and targets with relevant department managers and folks on the front-line

▶ Rehearsing the types of questions that an auditor might ask them (you may want to use the checklist you developed in the internal audit)

▶ Reviewing EMS roles and responsibilities

Prepare documents and records by:

▶ Ensuring they are current, easily retrievable, and controlled according to your document control procedures

For sample EMS Audit Checklists, Plans, and an Audit Report Template from wastewater facilities, see Appendix B.

Step 4) Conduct an EMS Desktop Review

An EMS "desktop" or document review is a review of written EMS policies, procedures and records that is developed before you conduct your full EMS internal audit and interview personnel. The desktop review is conducted to provide the audit team with a "snapshot" overview of an organization's EMS elements and how they fit together. A desktop review also provides the audit team with a first look at an organization's EMS and how the system elements fit with your current environmental programs and will therefore increase the efficiency of your full EMS internal audit.

Step 5) Conduct an EMS Internal Audit

Step 5a) Hold an Opening Meeting
Before you begin your internal audit, conduct an EMS opening meeting with management and relevant staff. During the meeting, go over: 1) the members of the audit team and introduce the team leader; 2) review the audit scope and the checklists/questionnaires that will be used; and 3) the audit schedule. Also, leave time at the end for questions.

This meeting will help set the stage on what to expect for your employees and management.

Step 5b) Audit Your System for EMS Conformance
Check your EMS by touring the site and observing the operations and services within your fenceline. While on-site, your audit team will want to review work practices and operations, interview employees, and examine procedures, documents and records.

Although not a requirement, it's important to use an EMS audit checklist/protocol to conduct your EMS internal audit. The checklist provides your audit team with typical ISO 14001 language, and audit tips and suggestions to ensure that all EMS elements and their requirements are covered and reviewed. Besides, it's a great tool to ensure consistency!

Step 5c) Report EMS Audit Results
As your audit team conducts and finalizes your internal EMS review, they will be taking notes, making observations, documenting audit findings, and writing up (if applicable) findings of nonconformance. Audit findings are typically documented and noted in a final report as either 1) observations (i.e., suggestions for improvement or a note on something done well); 2) major nonconformances (e.g., an entire system element is missing); 3) or minor nonconformances (e.g., One or two employees in the administration are overdue on EMS refresher training).

Nonconformances are discrepancies in your EMS that require attention through a corrective action. Corrective Action Reports (CARs) will be noted by the lead auditor and/or environmental management representative (EMR). CARs should include include the discrepancy and the timeframe, and the person(s) responsible for bringing the discrepancy back into EMS conformance.

Your EMS Lead Auditor will be tasked with completing an audit plan to determine the scope of each of your internal audits. The following should be included in each audit plan:

▶ a statement of the audit objectives

▶ an identification of the specific elements being audited

▶ a review of any special emphasis or focus (e.g., corrective actions from previous EMS audits)

▶ references to appropriate plans, procedures, or requirements documents

▶ a timetable for the audit

▶ an identification of the Audit Team and the members assigned rolls

▶ audit materials such as checklists, questionnaires, etc.

Three Keys to Success
(from wastewater facilities):

1. Streamline the EMS internal auditing process to be understandable for employees. Don't make the process too lengthy or complicated.

2. Perform an internal audit of your EMS system and processes—not individuals.

3. Make the EMS internal audit process positive—identify the good things and compliment people—as well as identify the opportunities for system improvements.

Examples of Nonconformance:

- No external/internal communication procedure
- Emergency preparation procedure exists, but is not posted
- A number of employees are not aware that you have an Environmental Policy

An EMS nonconformance requires a documented corrective action. An observation is a recognition noted during the audit that a system element may lead to a nonconformance; or if done correctly, could strengthen your EMS.

Examples of Observations

- Procedures that are long and difficult to follow
- Poor housekeeping
- EMS knowledge of pretreatment staff was excellent

More on documenting, managing, and closing out nonconformant EMS audit findings can be found in this Handbook in the next Section on Nonconformance and Corrective and Preventative Actions.

Step 6) Develop a System Procedure for Conducting Your EMS Internal Audits

Document your internal audit process in a system procedure that clearly defines what you'll do, roles and responsibilities, when they'll do it, how the information will be communicated, and where the information will be stored. This documented procedure will be a consistent, easily accessible, and clear guide for ensuring that this important element of your environmental management system is carried out according to your plans.

Policy

EMS Manual

Procedures

Work Instructions, Forms, Drawings, etc.

An EMS Internal Audit system procedure is required for this element. A system procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed for this element.

REMEMBER

Documenting a procedure is not enough to satisfy the EMS requirement and the audit team. It's critical to put the procedure into practice in your facility – to implement it and do what you say you will do. Within a few months it's time to verify that your procedure is working well, and if necessary, make any improvements.

For sample EMS Internal Auditing procedures from wastewater facilities, see Appendix A.

Step 7) Check the EMS Internal Audit Procedure for EMS Conformance

Here are some questions to investigate regarding your EMS internal audit procedure:

Check ✓

1. Have you determined who will be conducting your EMS Internal Audits?

2. Are they qualified and trained?

3. Do you have an EMS audit program that verifies the conformance of your EMS?

4. Are EMS findings of nonconformance documented?

5. Are corrective and preventative actions implemented for audit findings of past nonconformance?

6. Are audit checklists and reports maintained as EMS records?

7. Are audit results communicated to management?

> *Solicit internal auditors from various levels and functions of the organization to provide different viewpoints of the system. Set schedule to audit the entire system on a yearly basis.*
>
> James Naber
> Buncombe County, North Carolina
> Metropolitan Sewer District

REMEMBER

Your internal auditing program is a great tool for identifying areas to improve your system. In addition, it is a valuable step in preparing for external audits if you are pursuing third-party accreditation. Set up your internal audits to mirror the scope of your external audits.

Your EMS Internal Audit can Accomplish Several Things, Including:

1. It lets you know if the EMS element is being implemented as planned.

2. It gives employees practice in being audited.

3. It gives audit teams a chance to practice their auditing skills.

4. It reinforces everyone's involvement and responsibility in your EMS.

5. It's a teaching tool to get employees to understand each element of the EMS.

6. It's an important tool to measure how your system is or is not continually improving.

7. It's a "find, fix, and prevent" opportunity to identify weaknesses in procedures and work instructions before they become a documented part of your EMS.

> *Communication of your audit goals to all levels of the organization is crucial in providing a level of comfort and knowledge to field crews.*
>
> Chris Toth
> City of San Diego
> Wastewater Collection Division

Auditor Credentials

⇨ Independent of the areas being audited

⇨ Has an understanding of relevant laws and regulations

⇨ EMS training

⇨ An understanding of audit process and procedures

⇨ Good communication skills

⇨ An attention to detail

NOTE

A systems audit looks for system elements and system linkages. For example, did the environmental goals you set consider your significant impacts and what you said in your policy statement? A compliance audit looks for regulatory violations based on meeting specific laws and regulations. For example, are the discharges from your outfall within the permit limits?

Involving Contractors and Temporary Staff

If your contractor and temporary employees work in operations and services that your organization identified as significant, they should understand what is expected of them during your internal EMS audits. For example, temporary and contractor staff should understand the basics of your EMS Policy, what operations and services have significant aspects, and the environmental goals your wastewater facility is looking to achieve.

Suggestions on Conducting EMS Internal Audits from Wastewater Facilities and Other Public Organizations

"We've benefited from hiring an outside consultant to train our internal audit team. The outside expert credibility factor worked wonders in a short time.

We partnered with other public entities in our region and are using each other's audit teams for internal EMS audits. We get a fresh look at our own system, and we learn a lot about how others have implemented and improved their EMS. These are extremely valuable experiences for all of us.

We handed out a manual of all our work to date before our internal audit training. This proved very valuable in showing off the big picture and reinforcing what we had already accomplished so far. It also made the audits that much easier to conduct at each facility."

EMS Internal Auditing

(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- Establish an effective EMS internal audit program to continually evaluate and improve your EMS system.

The **Results** of this EMS element are:
- An EMS audit procedure (EMS Document) that covers scope, frequency, methods and responsibilities.
- A mechanism for EMS internal audit results (EMS Record) to be reported to management for the purpose of management review.
- An EMS Internal Audit Schedule/Plan that covers all elements of the EMS requirements.
- A group of trained EMS internal auditors identified and available to conduct EMS internal audits.
- Internal audit documentation, including checklists, reporting documents (e.g., an internal audit report), and summary documents (EMS Records) to review and follow-up on the results of audits.

Before you Begin this EMS element:
- Implement all elements of your EMS.
- Conduct EMS employee awareness and understanding training for all staff to prepare them for the internal audit process.

ISO 14001 Requirements	Key Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Environmental Management System Audit The organization shall establish and maintain (a) program(s) and procedures for periodic EMS audits to be carried out, in order to: a) determine whether or not the environmental management system 1) conforms to planned arrangements for environmental management including the requirements of this International Standard; and 2) has been properly implemented and maintained; and b) provide information on the results of audits to management. The organization's audit program, including any schedule, shall be based on the environmental importance of the activity concerned and the results of previous audits. To be comprehensive, the audit procedures shall cover the audit scope, frequency and methodologies, as well as the responsibilities and requirements for conducting audits and reporting results.	**Structure & Responsibility -** Employees and management are aware of their roles for your EMS internal audit program. **Training & Awareness -** Your organization has qualified, trained and capable EMS internal auditors. All staff are aware of their responsibilities during the EMS internal audit. **Corrective Actions** - Establish a report (CAR) that identifies EMS audit discrepancies, action items, responsibilities and timeframes for improving your system. **Management Review** - Meet with top management to discuss new or changed priorities based on your internal audit results.	EMS Audit Procedure Audit Records/Reports Corrective Action Reports (CARs) List on Nonconformances	Audit Plan/Schedule List of Qualified EMS/QS Auditors

Section 3: EMS Nonconformance and Corrective/Preventative Actions

What is an EMS Nonconformance?

Anonconformance is the audit term used to describe one or more EMS requirements that have not been addressed (i.e., no procedure) or have not been implemented (e.g., employees not following a procedure) within your organization's defined EMS fenceline.

Examples of Nonconformance:

- No external/internal communication procedure
- Emergency preparation procedure exists, but is not posted
- A number of employees are not aware that you have an environmental policy

Step-by-Step Guide to Nonconformance and Corrective and Preventative Action

Step 1) Identify EMS Nonconformances
Step 2) Identify Root Causes and Prevent their Reoccurrence
Step 3) Implement Corrective and Preventative Actions
Step 4) Update and Communicate EMS Corrective and Preventative Actions
Step 5) Develop a System Procedure for Nonconformance and Corrective and Preventative Actions
Step 6) Check Your Nonconformance and Corrective and Preventative Action Procedure for EMS Conformance

Step 1) Identify EMS Nonconformances

EMS nonconformances (potential problems or areas requiring improvement) can be initiated in a number of ways, including through 1) audit "findings"; 2) suggestions from employees (e.g., from working with day-to-day operating procedures); and 3) monitoring your significant environmental issues. To manage your EMS nonconformances, identify and investigate your EMS deficiencies, determine their root causes, and implement corrective and preventative actions to manage them and verify their effectiveness. A corrective and preventative action program will do this for you.

A sample Corrective/Preventative Action Request/Report (CPAR) is attached at the end of this Section.

Key Section Terms
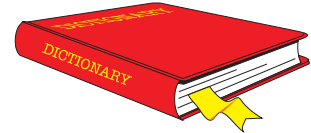
Audit Finding – The discovery of a lack of conformance to the requirements of an EMS (ISO 14001-based) criteria/checklist. All audit findings must be resolved as found during the internal audit or through a formal EMS process of corrective and preventative action.

Corrective Actions – As a result of the audit findings, corrective action reports (CARs) are assigned to all nonconformances to correct EMS deficiencies as they occur. CARs track an audit finding, and assign tasks to be completed, responsibilities, and timeframes.

Corrective Action Request (CAR) – A report form to identify, track and manage corrective actions.

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 your EMS.

Major Nonconformance – A deficiency in meeting the requirements of an EMS. One or more of the 17 elements of the EMS are not addressed (e.g., no system procedure) or implemented (e.g., not following a system procedure as written).

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 your system. For example, a number of employees were overdue on their EMS refresher training.

Key Section Terms, continued

Observation – A recognition of something done incorrectly or an area of concern. While not a major or minor nonconformance with an EMS requirement, if done correctly it could strengthen the EMS or if done incorrectly, could potentially cause a system failure.

Preventive Actions – A proactive approach to managing actions that are assigned to any EMS nonconformance made that will prevent potential environmental issues before they occur.

Root Cause – Underlying reason that led to or may lead to an EMS nonconformance. For example, if a group of employees were not following a procedure, the underlying cause could be that they were not properly trained on the procedure or that an updated procedure was not communicated to them.

System Procedure – An EMS required document that establishes an element's purpose, scope, roles & responsibilities, the tasks to be completed, and where or how the associated records and documents are maintained.

Typical Causes of EMS Nonconformances Include:

✓ Poor communication
✓ Faulty or missing procedures
✓ Equipment malfunction (or lack of maintenance)
✓ Lack of training
✓ Lack of understanding of an EMS requirement
✓ Not following an EMS requirement

Step 2) Identify Root Causes and Prevent their Reoccurrence

While many corrective actions may be "common sense," look beneath the surface to determine why the problems occurred in the first place. Many organizations use the term "root cause" in their corrective and preventative action processes. By determining the root causes of your nonconformances, you are simply looking past the most obvious or immediate reasons to determine why it occurred.

For example, a new procedure was recently updated by the document control center to include an EMS initiative to recycle oil and grease. However, it was noted on the most recent EMS internal audit that employees in maintenance were not disposing of their oils and greases properly. So how would you determine the root cause of this nonconformance?

By performing a check of the potential sources or causes of nonconformance.

◆ Was the procedure updated with the new recycling initiative? Yes.
◆ Were all employees in maintenance trained and was the new procedure communicated? Yes.
◆ Were they using the most current procedure? No.

Even though employees were trained on the new procedure, it was determined that employees were still using a hard copy procedure that was outdated and that did not include the updates on recycling. It's important to find the cause of the nonconformance in order to fix it and prevent it from reoccurring.

Step 3) Implement Corrective and Preventative Actions

Correct, prevent and manage the nonconformance until it is corrected. This is done through a corrective/preventive action request or CAR.

A CAR identifies and describes the EMS nonconformance, the action items needed to implement the correction, the person(s) responsible for implementing and tracking the correction, and the timeframes for completion. A CAR is an EMS record and documents and tracks corrective actions until the action items from the nonconformance are completed by the established timeframes.

Step 4) Update and Communicate EMS Corrective and Preventative Actions

Update and communicate what you have learned. Based on your root cause review, you may need to update, train, and communicate procedures and work instructions, establish new programs, calibrate equipment, etc.

Let's look back at our example in which the personnel in maintenance were not recycling their oils and greases. It was determined through identifying the nonconformance root cause that the employees in maintenance were using an outdated procedure. As part of updating and communicating the completion of this particular CAR, and to prevent this nonconformance from occurring again: 1) make sure that the document control center "manages" (see section on EMS document and records) all hard copy procedures and work instructions; and 2) communicates and trains the changes to maintenance employees.

In addition, as part of "institutionalizing" this or other corrective actions, inform management so that your EMS improvements will become the new way to do things in your day-to-day operations. For example, from now on, the document control center will put a stamp or footer on all hard copy procedures with the following language: "If printed, this document is obsolete. See an employee from the Document Control Center for the most current version."

COACH'S CORNER

Follow a "find, fix, and prevent" approach for smaller issues rather than go through documentating nonconformances. If you're unsure which approach to follow you can start by documenting every finding and filling out a corrective action request (CAR) and then scale back at a later date. Remember, an EMS is about continual improvement.

REMEMBER

Nonconformances can also be identified outside of an EMS audit. Anyone in your wastewater facility can identify and report findings and make recommendations. This should be encouraged. Find ways to get employees involved in the EMS improvement process – whether formally or informally (for example, via suggestion boxes, contests or incentive programs).

NOTE

Completed CARs are EMS records that need to be traceable to an operation or activity and maintained for review.

Step 5) Develop a System Procedure for Nonconformance and Corrective and Preventative Action

Document your process for nonconformance and corrective and preventative action in a system procedure that clearly defines what you'll do, roles and responsibilities, when they'll do it, how the information will be communicated, and where the information will be stored. This documented procedure will be a consistent, easily accessible, and clear guide for ensuring that this important element of your EMS is carried out according to your plans.

For samples of Nonconformance and Corrective and Preventative Action procedures from wastewater facilities, see Appendix A.

Involving Contractors and Temporary Staff

Contractor and temporary employees should understand what is expected of them during your internal EMS audits. Therefore, if an EMS audit finding is found within their operation or service at your facility, they need to understand their roles and responsibilities in correcting the nonconformance (finding), and preventing the EMS audit finding from reoccurring.

Policy

EMS Manual

Procedures

Work Instructions, Forms, Drawings, etc.
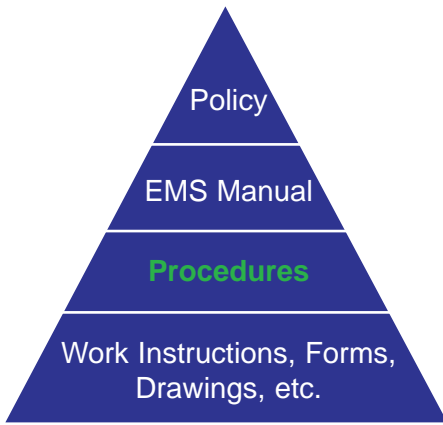
*A Nonconformance and Corrective and Preventative Action **procedure** is required for this element. A procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed for this element.*

Three Keys to Success

(from wastewater facilities):

1. Focus on correcting and preventing problems. Preventing problems is cheaper than fixing them after they occur (or after they reoccur).

2. EMS nonconformances 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.

3. Be sure that your corrective & preventive action process specifies roles and responsibilities and schedules for completion for Corrective Action Reports (CARs).

Step 6) Check Your Nonconformance and Corrective and Preventative Action Procedure for EMS Conformance

About two or three months after you have documented and implemented your Nonconformance and Corrective and Preventative Action procedure, check to see if it is working according to your plans. Here are some questions to investigate:

Check ✓

1. Do you have a procedure for identifying, managing, tracking, and completing (closing) EMS nonconformances?
2. Does your process include identifying the root cause and assigning responsibilities and timeframes for completing the corrective actions?
3. Do you document and record your corrective actions?
4. Do you have a procedure to prevent nonconformances from reoccurring?

> **NOTE**
> Start thinking about your EMS nonconformances as opportunities to improve. Also, don't forget to document what you are doing well!

After an EMS nonconformance, consult with your employees on how they would implement a solution. Your frontline employees have great ideas on how to improve operations, since they wrestle with the same type of issues each day. The challenge of a manager is how to get ideas out of these individuals, use their knowledge, and reward them for their concepts and foresight.

Rick Bickerstaff
Charleston, South Carolina
Commissioners of Public Works

> *When you receive a nonconformance, take a breath and try to think about the whole system. Try to avoid jumping in with a quick fix. A quick fix can trigger other unintended consequences that may be another problem down the road.*

> Donna Adams
> Eugene, Oregon
> Wastewater Division

Three Lessons Learned
(from wastewater facilities):

1. Your corrective actions should be based on good information and analysis of root cause. While many corrective actions may be "common sense," you need to look beneath the surface to determine why problems occur.

2. Designate employees from the areas where the nonconformances occurred as the ones responsible for implementing their corrective and preventative actions. These personnel will be the best at identifying appropriate corrective and preventative actions, and the process will get them involved in the EMS.

3. Review your EMS progress regularly and follow up to ensure that corrective actions taken are effective.

Three Things to Avoid
(from wastewater facilities):

1. Starting from scratch. If your organization 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 your EMS.

2. Not documenting and resolving your nonconformances in a timely manner.

3. Not documenting EMS activities that are going well. In addition to documenting nonconformances or problems with your EMS, identify and document EMS successes. This will motivate your staff and help ensure EMS buy-in.

Nonconformance and Corrective and Preventative Action
(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- ❏ Implement a Corrective and Preventative Action (improvement) process that will identify and manage problems identified in your EMS.

The **Results** of this EMS requirement are:
- ❏ A Nonconformance and Corrective and Preventive Action procedure (EMS Document), that identifies, tracks and closes out corrective and preventative actions.
- ❏ Corrective and Preventative Action Reports (EMS Records).

Before you Begin this EMS element:
- ❏ Develop formal (e.g., audits) and non-formal (e.g., employee suggestions) methods to identify nonconformances or areas that require improvement within your EMS.

ISO 14001 Requirements	Key Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Nonconformance and Corrective and Preventive Action The organization shall establish and maintain procedures for defining responsibility and authority for handling and investigating nonconformance, taking action to mitigate any impacts caused and for initiating and completing corrective and preventive action. Any corrective or preventive action taken to eliminate the causes of actual and potential nonconformances shall be appropriate to the magnitude of problems and commensurate with the environmental impact encountered. The organization shall implement and record any changes in the documented procedures resulting from corrective and preventive action.	**Operational Control** – make sure controls (e.g., procedures, work instructions, manuals, etc.) are in place to prevent EMS nonconformances. **Monitoring & Measurement** – monitor your significant environmental aspects to determine if they are under control. **EMS Audits** – internal EMS reviews provide a source to identify EMS nonconformances. **Management Review** – review nonconformances, corrective and preventative actions, and completion of nonconformant issues with management as a way to continually improve and institutionalize the EMS at your facility.	Nonconformance and Corrective and Preventive Action Procedure Corrective and Preventive Action Requests (CPARs)	CAR Logs

Corrective/Preventative Action Request/Report

A. Area/Department:	
Audit Date: Auditee(s):	Auditor(s): Date:
B. Description of Non-Conformance: Audit Criteria: Applicable ISO 14001 Element:	C. Root Cause Analysis:
D. Corrective Action: Date of Implementation:	
E. Preventative Action: Date of Implementation:	
F. Verification of Completion: Date of Verification:	
Auditor (signed):	Date:

Phase V: Management Review

You are now ready to begin the Management Review Phase of the EMS cycle. Each section of the Handbook will guide you step-by-step through each of the EMS activities. Refer to the icons for case studies, sample documents, keys to successes and other implementation assistance. At the end of each section, two handy reference sheets review the **Purpose** of each r e q u i r e m e n t, describe the **Results** you'll be developing, discuss how to **Prepare** to do the work, and show how the element links to other EMS requirements.
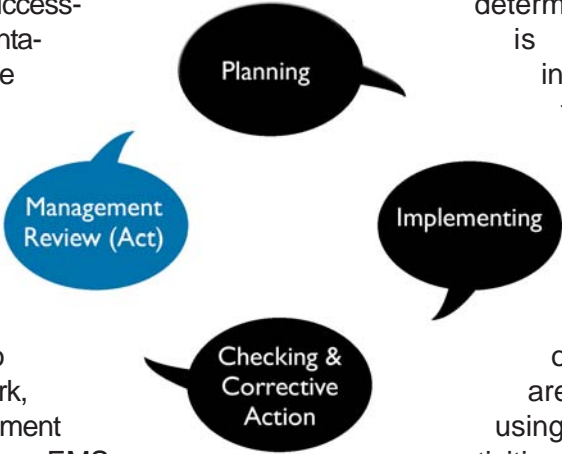
In this phase, your organization will take the opportunity to assess your EMS performance and judge the suitability, adequacy, and effectiveness of the system. As part of this review, your EMS Team will consider, through dialogue with senior management, new organizational goals. This phase is an opportunity for top management to review and fine-tune your EMS and make course corrections, if needed. Top management will determine whether the EMS is functioning as you intended, where additional resources may need to be allocated, if your environmental policy is appropriate or needs to be revised, and if your organization's objectives and targets are on track. If you are using a two-year cycle, the activities in this phase can be comfortably accomplished in about one month.

Here's a checklist of requirements in this Phase:

Phase V EMS Requirements (1 month)	
Management Review	✓
Organizational Goal Assessment	✓
Apply Lessons Learned for Continual Improvement	✓

Section 3: Management Review

The management review is the final element in your EMS cycle ("Act"). It's an opportunity to review the effectiveness of your EMS with top management and fine-tune your EMS and make course corrections. Top management will help determine whether the EMS is functioning properly, where additional resources need to be allocated, and if the environmental policy is appropriate or needs to be revised. The management review provides opportunities for continual improvements to be implemented into the system.

The management review element provides the opportunity for constructive dialogue with management to judge the suitability, adequacy, and effectiveness of the EMS. Seize the opportunity to reflect upon your organization's environmental policy and commitment to continuous improvement. Are resources, both time and monetary, being strategically employed? Are there any course corrections that need to be made? Are you on the right path to efficiently and effectively meeting your organization's EMS objectives and targets?

Step-by-Step Guide to Management Review

Step 1) Determine When and What to Review
Step 2) Identify Who Should Attend Your Management Review
Step 3) Document Accomplishments and Follow-up Actions
Step 4) Develop an EMS System Procedure for Management Review
Step 5) Check Your Management Review Procedure for EMS Conformance

Step 1) Determine When and What to Review

Schedule your Management Reviews at appropriate intervals, typically after your EMS internal audits, to check on the progress of your objectives and targets, but at least annually. Determine a management review frequency that will work best for your organization.

What to Review

There is a wide range of information you can report to management. Decide with your Core Team the appropriate information to communicate. Present the information to management so it is easily understood without overloading them with details.

Key Section Terms
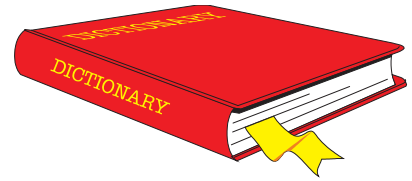
EMS Audit – A systematic, documented verification process of objectively obtaining and evaluating an organization's EMS to determine whether or not it conforms to the environmental audit criteria pre-defined by the organization and applicable standards (i.e. the ISO 14001 Standard).

Continual Improvement – The principle of continual improvement, as fundamental to the ISO 14001 Standard, 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. Continual 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.

Environmental Policy – Statement by the organization of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets.

Environmental Objective – Overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve, and which is quantified where practicable. Objectives are based on specific significant aspects.

Environmental Target – Detailed performance requirement, quantified where practicable, based on an organization's defined environmental objectives and that must be met to achieve those objectives.

Three Things to Avoid

(from wastewater facilities):

1. Not communicating with top management on what they would like to review to access the performance of the EMS.

2. Conducting only annual reviews. Consider having management reviews every quarter to give management an update and to check the progress of your EMS.

3. 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 your organization.

Use objective information from internal audits and other "checks." Focus on performance and not on process or procedures. You might consider providing some information (e.g., status on meeting EMS objectives and targets, etc.) to management before the meeting. Since the EMR is the communication "link" between the organization's EMS activities and management, it is his/her responsibility to pull the information and materials together to allow management to conduct an adequate and constructive review. However, as with all EMS activities, this is a team effort. Work together with your Core Team and other personnel to ensure that everyone is on the same page and that information flows laterally and from the top-down and the bottom-up.

Step 2) Identify Who Should Attend Your Management Review

Make sure you get managers involved that can make key decisions regarding your EMS. You identified top management (Phase I) earlier in the implementation process. Are these the same people you will have in the management review meeting?

Two kinds of people should be involved in the management review process:

⇨ People who have the right kind of information/knowledge
⇨ People who can make decisions about the organization and its resources (top management).

Wastewater organizations that have implemented EMSs at their facilities have indicated that Public Works Directors, General Managers, Plant Managers, Line and Division Managers (especially within areas where objectives and targets were set), the EMR, and invited City/County Commissioners, other local leaders and citizen groups attended Management Reviews.

Step 3) Document Accomplishments and Follow-up Actions

EMS progress and updates from implementing the EMS can be reported back to management in the monthly "good news" stories or in other creative ways. During management review meetings, make sure that someone documents and records what issues were discussed, what decisions were reached, and follow up on action items and responsibilities.

REMEMBER

Remember to track and document your EMS performance and benefits to management on a regular basis. How well you are reaching your environmental goals, avoiding accidents and spills, and saving money is very important to management as they develop plans and allocate resources.

"Conduct a management review at least annually to review your entire EMS. To be more proactive, conduct quarterly management reviews to assess internal quarterly audits and quarterly legal requirements. This allows a snap shot, every three months, of your system progress."

James Naber
Buncombe County, North Carolina
Metropolitan Sewer District

Step 4) Develop EMS System Procedures for Management Review

When you're satisfied that your process for conducting management review conforms to the EMS requirements, document the process in a system procedure. As with all EMS system procedures, it needs to clearly define what, who, when, how, and where.

For samples of Management Review procedures and a Management Review Agenda from wastewater facilities, see Appendix A.

Step 5) Check Your Management Review Procedure for EMS Conformance

Check ✓

1. Are management reviews scheduled on a regular (at least annual) basis?
2. Does the management review check for the effectiveness of the EMS based on policy, Objectives & Targets, previous audits, changes to operations, etc.?
3. Are management reviews documented and recorded? Are action items tracked?

"Attempting to implement improvements to your operations will be futile if you don't have management's full support, commitment and involvement."

Rick Bickerstaff
Charleston, South Carolina
Commissioners of Public Works

Information to Cover During the Management Review

▶ Audit results - EMS and compliance status

▶ External communications

▶ Progress on achieving objectives and targets

▶ Progress towards or achievement of environmental performance measures

▶ Reports of emergencies, spills, other incidents and/or accidents

▶ Status of corrective actions

▶ Results of action items from previous management review meetings

▶ Policy revision based on EMS effectiveness and suitability

▶ Changing circumstances (e.g., changes in operations or services, new customers, etc.)

Policy

EMS Manual

Procedures

Work Instructions, Forms, Drawings, etc.
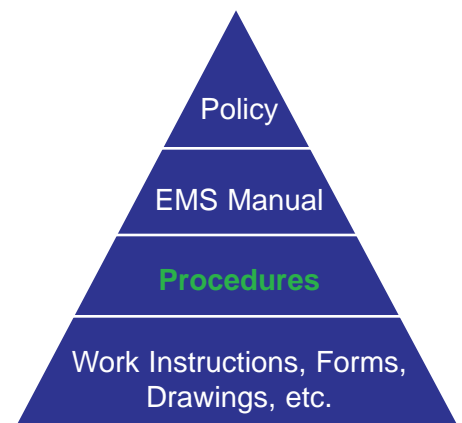
A Management Review **system procedure** is required for this element. A system procedure defines the purpose (why the procedure is needed), scope (to what operations/areas/staff the procedure applies), roles & responsibilities (who needs to complete the tasks), and the tasks that need to be completed for this element.

1. Top management must receive frequent updates, especially with regard to the status and performance of your EMS objectives and targets.

2. Management reviews should assess how changing circumstances might influence the suitability, effectiveness or adequacy of your EMS. Changing circumstances might be internal to your organization (such as new facilities, changes in products or services, new customers, etc.) or might be external factors (such as new laws, new scientific information, changes in political leadership, or changes in adjacent land use).

3. As you assess potential changes to your EMS, consider other organizational plans and goals. In this way, environmental decision-making can be integrated into your overall management and strategy.

Three Lessons Learned

(from wastewater facilities):

1. 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.

2. 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.

3. Ensure that all levels of management (division, line managers, etc.) participate in management review meetings.

Our planning has improved considerably. Prior to EMS establishment, no formal, consistent structure was available for environmental planning. Also, our planning is much more focused by having a management review process. EMS drivers are known in our place, and employees have a better understanding of the reasons behind planning initiatives. Additionally, knowledge of our facility's impact on the environment has been heightened and is reviewed on a regular basis.

Rick Bickerstaff
Charleston, South Carolina
Commissioners of Public Works

Management review meetings provide good guidance for progress and improvement, a resource for future projects, and a strategic direction for future departments' involvement.

Tri-County Metropolitan Transportation District
Portland, Oregon

Management Review

(Cut out this section for handy reference)

The **Purpose** of this EMS element is to:
- ❑ Establish a management review system to check the effectiveness and adequacy of the EMS.

The **Results** of this EMS element are:
- ❑ Identification and confirmation of a group of key management level personnel who will attend scheduled management review sessions.
- ❑ Development of a management review procedure (EMS Document) that addresses the requirements of the EMS and is appropriate and effective to your organization's operations and services.
- ❑ Establishment of a schedule, agenda, and meeting notes (EMS Record) for your management reviews.

Before you Begin this EMS element:
- ❑ Establish an EMS internal audit and corrective action system.
- ❑ Establish all elements of your EMS.

ISO 14001 Requirements	Links to Other EMS Elements	Required Documents & Records	Optional Documents & Records
Management Review The organization's top management shall, at intervals that it determines, review the environmental management system, to ensure its continuing suitability, adequacy and effectiveness. The management review process shall ensure that the necessary information is collected to allow management to carry out this evaluation. This review shall be documented. The management review shall address the possible need for changes to policy, objectives and other elements of the environmental management system, in the light of environmental management system audit results, changing circumstances and the commitment to continual improvement.	All elements of the EMS are linked as part of the Management Review.	Management Review Procedure Meeting Minutes	Management Review Agenda

Section 4: Third-Party Registration

Now that you have conducted your EMS Internal Review and Management Assessment at your wastewater facility, you may want to consider a third-party audit of your EMS and go for ISO certification.

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. Most Publicly Owned Treatment Works (POTWs) in the U.S., including those who helped develop this guide, have followed this approach to EMS implementation.

What this Section Will Cover:

⇨ Third-Party Registration

⇨ Why Wastewater Facilities Choose Third-Party Registration

⇨ The Benefits of Third-Party Registration

⇨ Step-by-Step Overview of a Third-Party Registration Process

⇨ The Keys to Selecting a Third-Party Registrar

⇨ The Costs and Typical Timeline of Third-Party Registration

⇨ The Keys, Lessons Learned and Things to Avoid when Considering Third-Party Registration

⇨ EMS Registrar POCs with Wastewater and Public Sector Experience

⇨ FAQs

Key Section Terms
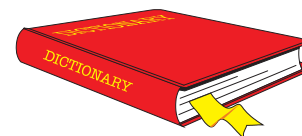
ISO 14001 – The standard protocol (requirements document) in the ISO 14000 series that specifies the necessary elements of an EMS.

Auditor – Person with the qualifications to conduct an EMS audit.

American National Standards Institute Registrar Accreditation Board (ANSI-RAB) – Body that accredits ISO 14001 Environmental Management Systems (EMS) registrars and auditors.

Conformance – To verify an organization's EMS to a specified standard (ISO 14001).

Registrar – A third-party organization that awards the EMS certification.

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 ISO 14001 Standard.

Surveillance – A scheduled sampling of EMS elements to maintain a third-party registration.

Third-Party – An independent EMS auditor that is qualified to conduct EMS audits.

One wastewater facility used a RFP selection process to choose its Third-Party registrar based on the following criteria:

- ☑ Registrar's experience conducting ISO Registration Services. (20 Points)
- ☑ Registrar's experience conducting ISO Registration Services for public agencies, particularly wastewater treatment agencies. (20 points)
- ☑ Qualifications and experience of assigned lead auditor(s). (20 points)
- ☑ Match of registrar's auditing philosophy with our EMS policy, goals, and objectives. (20 points)
- ☑ Registrar's experience and reputation for satisfactory work, judgment, integrity, and reliability. (Used Reference Checks) (20 points)
- ☑ Overall cost of the proposal. (20 points)

What is Third-Party Registration?

Third-party registration is an independent review and recognized validation of an organization's EMS. An organization can meet the objectives and requirements of an ISO 14001 EMS either through self-declaration or through third-party registration. Many public organizations that have chosen third-party registration have experienced a greater level of credibility with their communities and outside stakeholders because of the independent review.

Third-Party Registration Audit	Regulatory Compliance Audit
Looks for system elements and linkages	Looks for regulatory violations
Based on verifying that the 17 elements of an EMS are institutionalized	Based upon meeting applicable environmental laws and regulations
Focuses on employee interviews and document review	Focuses on individual operations and outputs

Why Wastewater Facilities Choose Third-Party Registration: The Drivers & Benefits

A successful third-party review of an organization's EMS can help maintain a system's integrity, establish credibility, and inspire greater confidence in external stakeholders (e.g., the public, regulators, governments, and other organizations); third-party registrars act independently and review an organization's EMS in an unbiased manner.

"To add system credibility from an outside independent source."
Buncombe County, North Carolina

"Good Public Relations" and "Incentives from regulatory agencies to provide benefits to environmentally proactive organizations."
Gastonia, North Carolina

"To force private contractors to achieve similar service and verifiable levels."
San Diego, California

Internal Benefits of a EMS Third-Party Registration:

- Assures that EMS system elements are in place and working as expected
- Protects the investment made in the EMS
- Keeps management's and staff's attention on the EMS

External Benefits of a EMS Third-Party Registration:

- Provides credibility and commitment to external stakeholders
- Improves relationship with regulators
- Supports federal and state EMS incentive programs

Questions to Think About When Considering a Third-Party Registration:

- Are competitors and peer organizations pursuing registration?
- Are "customers" indicating that they require or desire registration?
- Will registration improve the relationship with regulatory agencies?
- Will insurers offer preferential treatment because of perceived lower risk?
- Will registration improve public relations with the surrounding community?

Step-by-Step Guide to Third-Party EMS Registration

1) Select a Registrar
2) Prepare Staff for EMS Third-Party Registration Audit
3) Have an EMS Desktop Review Conducted
4) Support the EMS Third-Party Registration Audit
5) Follow-up on the EMS Third-Party Registration Audit

Step 1) Select a Registrar

How should you go about selecting a registrar to externally verify your EMS? And what should you look for in a registrar? What about costs? These questions were put to wastewater facilities that have been there.

Asking the "right" questions…

Each organization must consider whether an ISO 14001 registration will provide worthwhile benefits. Five (5) wastewater treatment facilities

NOTE

Each organization must consider whether an ISO 14001 registration will provide worthwhile benefits. Five wastewater treatment facilities from around the country and of various sizes were asked to provide their experiences, lessons learned and the keys to success as they went through the process of third-party registration. All of the facilities have implemented and maintained third-party registered EMSs.

Wastewater Facility Benefits

"Third-Party EMS registration confirms to the public and regulatory agencies that the ISO standard is being conformed to. Second, having a Third-Party audit prompts CPW's staff to develop better strategies on how to conform to the standard. Third, the Third-Party audit gives management a greater sense that the system is in place and is doing exactly what it was designed to accomplish."

Rick Bickerstaff
Charleston, South Carolina
Commissioners of Public Works

"The Third-Party registration process gave us the staying power to build a system that, now if maintained as intended, will provide a framework for continual environmental and other organizational improvements. This system ensures management's continued involvement in clearly defining our environmental goals, keeps staff more engaged and accountable, provides another perspective outside of the organization, provides us a much better document control system, and provides better credibility and service to the communities we serve."

Donna Adams
Eugene, Oregon
Wastewater Division

Keys to Success

1. Be flexible. Don't 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 nonconformances.

2. 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.

3. 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.

4. Look for ISO 14001 third-party auditors with wastewater and public sector credentials and experience.

5. 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.

from around the country and of various sizes were asked to provide their experiences, lessons learned and the keys to success as they went through the process of third-party registration. All of the facilities have implemented and maintained third-party registered EMSs.

NOTE
- Four of five of the wastewater managers conducted qualifying interviews with Registrars.
- Four of five interviewed multiple Registrars.

Wastewater facilities that conducted interviews to qualify registrars considered the following to be the most important in registrar selection:

- Public, utility, chemical and wastewater sector experience.

- Comfort with the auditor; personality of the auditor relating to staff; staff level of comfort and friendliness with the auditor (i.e., shirt and tie — NO; blue jeans and boots — YES).
- Good price for services received.
- Knowledge of how public entities are set up and operate.
- The added value expected from the registrar through the registration process.
- Technical and auditing expertise of the registrar staff.

Step 2) Prepare Staff for EMS Third-Party Registration Audit

Congratulations! You've made the decision that a third-party registration of your EMS makes good business sense. You've interviewed several registrars, and have decided on one company that best suits your organization. You've signed a contract, developed an audit plan and agreed on an audit schedule. You are ready to go and so are the auditors. Generally, when the auditors arrive they will have a tight schedule of documents to review, people to interview, reports to write, and audit results to discuss. Your job is to support the audit function by preparing your managers, your employees, and your documents and records. All of these should be readily available for the auditors according to the prearranged audit schedule.

Well in advance of the audit, prepare management by:
- ▶ Reviewing their EMS responsibilities
- ▶ Rehearsing the type of questions that the auditor might ask them (see NSF guide Second Addition, Appendix A, pages 153 - 156)
- ▶ Preparing them to organize and track corrective actions that the audit identifies. (i.e., how the organization will respond to nonconformances if found)

NOTE
A team of individuals typically made the choice on which registrar to select at wastewater treatment facilities, with top management giving the final approval (sign-off).

- Indicating on managers' calendars suggested times for the pre-audit meeting to review the audit scope, plan and schedule, and the closing meeting to share audit findings
- Encouraging them to be visible, involved, and available for the month of preparation preceding the registration audit
- Freeing up the Environmental Management Representative to accompany auditors on their rounds

Well in advance of the audit, prepare employees by:
- Emphasizing the "find, fix, and prevent" opportunity the audit provides.
- Reviewing the environmental policy and confirming the role it has in employees' daily activities
- Reviewing significant aspects, objectives and targets with relevant department managers and the front-line
- Rehearsing the type of questions that the auditor might ask employees (you may want to use the checklist you developed in the internal audit)
- Reviewing EMS roles and responsibilities

> **NOTE**
> Wastewater Facilities: Four of Five have six-month surveillance audits and One of Five have three-month surveillance audits.

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

Step 3) Have an EMS Desktop Review Conducted

An EMS "desktop" or document review, required for an EMS registration audit, is a review (by a third-party) of EMS policies, procedures and records before the third-party auditor comes onsite to conduct a full EMS audit and interview personnel. Some auditors prefer to conduct this onsite in conjunction with other audit activities. The desktop is conducted to provide the auditor a "snapshot" overview of an organization's EMS elements and how they fit together. A desktop review also provides the auditor with a first look at an organization's EMS and how the system elements fit with your current environmental programs and will therefore increase the efficiency of the third-party on-site audit.

An EMS desktop review will benefit the organization by assuring that key documents and records are in place and accessible.

> **NOTE**
> The five wastewater facilities that have an EMS in place and contributed to this Handbook had EMS desktop reviews conducted approximately two months before the third-party on-site audit.

Lessons Learned

(from wastewater facilities):

1. Don't be afraid to disagree with the auditor and stand up for your program if you feel what you have done meets the requirements of the standard.

2. Contact other organizations that have been successful in passing their thir-party registration audit for information and documentation examples, so that you learn from the experiences of other organizations.

3. Keep it simple! This is particularly true for your 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.

4. Only have one current procedure available for what you do! Remove old documents before your third-party audit.

5. When the third-party auditors come out to review your EMS, make sure to stress to employees that the auditors are not auditing them, but auditing a system.

Things to Avoid

(from wasterwater facilities):

1. 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.

2. Unnecessary interruptions during the registration audit.

3. Selecting registrars with no technical or related industry expertise.

4. Being unprepared! The Environmental Management Representative, Document Administrators and **all** key staff must be prepared before a third-party audit.

NOTE

Consider having a third party review your EMS whether you decide to officially certify to ISO 14001 or not. An external set of eyes will help you identify new opportunities to improve your EMS that you may have missed. If cost is an issue, consider asking other public organizations in your area to form a pool of qualified auditors and review each other's EMSs.

NOTE

Do not stress! Employees do not have to give textbook answers to the auditor. They simply need to know the basics of an EMS and how it affects their jobs.

Step 4) Support the EMS Third-Party Registration Audit

Support an EMS registration audit by:

☛ Providing facilities (i.e., place to work, computers, etc.) required for the third-party audit team to be effective and efficient.

☛ Providing access to on-site areas and systems to interview personnel and retrieve documents and records.

☛ Cooperating with the audit team so that the EMS third-party audit objectives will be achieved.

Step 5) Follow-up on the EMS Third-Party Registration Audit

Once the third-party audit has been completed, the audit team will review the findings so that the organization will have a clear understanding of the audit team's findings. One of the following recommendations will then be given:

Recommend registration: certification is immediately issued and the organization is added to the public register.

Recommend registration after corrective actions: minor nonconformances or "find, fix, and prevent" issues were found and will be corrected within a prescribed time period that is agreed upon by both the auditing organization and the facility.

Recommend onsite re-audit: one or more findings of major nonconformance were found or enough minor nonconformances were identified by the third-party audit to show system inconsistencies.

Remember that this is a find, fix, and prevent management system. A finding of a major nonconformance is unlikely since you've had the third-party auditor(s) conduct a desktop review and you've prepared your staff. Use your own internal EMS audits and the third-party audit as an opportunity to improve your EMS.

NOTE

An ISO 14001-based EMS registration is valid for three years. Once completing the registration, an organization can choose to have an EMS surveillance (sampling) audit every six months or every year, but must have all elements of an (ISO 14001) EMS audited at least every three years to maintain third-party registration.

Activities/Timeline of EMS Initial Registration Process

- ◆ Development and solicitation of RFP or Qualifications - average one to two months
- ◆ Interviewing, Negotiations and Selection - average one month
- ◆ Arrangement of Audit Schedule - average one month
- ◆ Pre-Review (Desktop Audit) - average one to two months
- ◆ Registration Audit - average three days

These tasks take place concurrently.
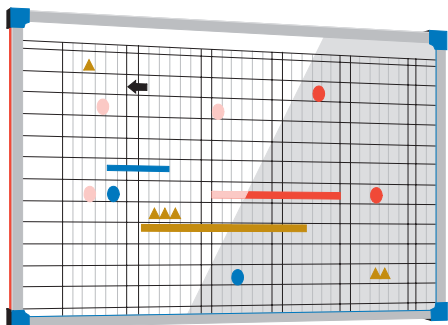
What if I do not Choose Third-Party Registration?

If all requirements of an ISO 14001 EMS are fully implemented and self-declared, then the organization will reap the same internal benefits as an organization earning third-party registration. The primary difference between the two is the independent, objective credibility provided by a third-party registration. If the third-party objectivity and credibility are irrelevant to the organization, then self-declaration of an ISO 14001 EMS may be preferred.

"ISO 14001 Registration conveys a positive, professional image to our sewer ratepayers and to community non-governmental organizations. ISO 14001 Registration also provides our own employees with a real sense of professional competence and accomplishment. Our employees connect with our governmental organization being a business system and our management decisions based upon a Plan-Do-Check-Act system rather than politics or personalities."

Chris Toth
City of San Diego
Wastewater Collection Division

"ISO registration gets an objective set of eyes in to look at your system and it adds credibility to what you have done. Additionally, we feel that it strengthens our position against potential privatization since it would be difficult for a private company to compete with our management process and offer the same customer service to our citizens and the environment and manage the organization better than we do."

Beth Eckert
Gastonia, North Carolina
Public Works and Utilities Department

Table 1.0 Costs and Number of Auditors/Days for EMS Initial and Surveillance Audits.

WW Facility	Fenceline	Size (In Average MGD OF WW)	Year of Initial Registration	Initial Registration Cost	# of Auditors	# of Days Auditor(s) On Site	Ongoing Costs of (External) Surveillance/ Maintenance Audits (in Dollars/Year)	# of Auditor(s)	# of Days Auditor(s) On Site
Buncombe	WW Plant	40	2002	$ 10,500	1	2.5	$ 3,000	1	1.5
Gastonia	Two WW Plants, lab, pretreatment	22	2001	$ 7,500	2	2.5	$ 3,200	1	1
San Diego	Operations and Maintenance Division	180	1999	$ 7,000	2	3	$ 5,000	2	3
Charleston	WW Plant	36	1999	$ 11,000	2	4	$ 9,000	2	4
Eugene	WW Division, not including O&M	62	2001	$ 8,300*	1	3	$ 3,000	1	1

Note: included application fee, desk audit, on-site readiness review, registration audit, and final report

Table 2.0 EMS Registrar Experience and POC Information.

from EMS Wastewater Steering Committee

EMS Registrar POC Info	Wastewater Experience? (Yes Or No)	Public Organization Experience? (Yes Or No)
Registrar name: NSF International Strategic Registrations, Ltd Address: 789 N. Dixboro Road, Ann Arbor, MI 48105 Phone #: 1-888-NSF-9000 Email Contact: Website: www.gehrke@nsf-isr.org	Yes	Yes
Registrar Name: Advanced Waste Management Address: 6430 Hixson Pike, Chattanooga, TN 37343 phone #: 423-843-2206 Email Contact: mail@awm.net Website: http://www.awm.net	With Charleston CPW Only	No
Registrar Name: AQA International Address: 1105 Belleview Avenue, Columbia, SC 29201 Phone #: 803-779-8150 Email contact: bob@aqausa.com Website: www.aqausa.com	Yes	Yes
ABS Quality Evaluations Registrar Name: Georgene Porter Address: 16855 Northchase Drive, Houston, TX 77060 Phone #: 281-877-6800 Email contact: Website: www.absconsulting.com	Yes	Yes
ABS Quality Evaluations Registrar Name: Jack Carmody Address: 16855 Northchase Drive, Houston, TX 77060 Phone #: 281-877-6800 Email Contact: Website: www.absconsulting.com	Yes	Yes

Frequently Asked Questions about ISO 14001 Third-Party Registration

While third-party registration may be common in industry, it is a relatively new concept for public entities. The PEER Center has gathered the questions most commonly posed about ISO 14001 registration and asked a registrar to answer them for you. Questions are organized in a "Before," "During," and "After Registration" format:

Before Registration:
Q. What is the difference between the terms "registration" and "certification?"
A. In common usage and even in publications, the terms are used interchangeably. The distinction can be made that you "register" a management system and "certify" to a product standard but this distinction is rarely noted in the world of ISO 14001. Even the Standard refers to "certification/registration."

Q. Who is ANSI-RAB and what is their role in registration?
A. RAB stands for the Registrar Accreditation Board. The American National Standards Institute (ANSI) and RAB have joined to form the National Accreditation Program (NAP) for ISO 14001 and 9000. The NAP also covers the accreditation of providers offering the 36-hour Lead EMS Auditor course. Registration programs for both EMS and QMS auditors are operated solely by RAB, separate from the NAP.

RAB, headquartered in Milwaukee, WI, is a not-for-profit organization that is financially self-supported and governed by a 15-member board of directors. Members of the board represent both quality and environmental stakeholders and include technical experts, business executives, industry representatives, and employees of registrar organizations.

Q. How can I find out who the accredited registrars are?
A. The RAB website at www.rabnet.com contains a list of accredited registrars.

Q. How can I find out who the registrars with wastewater and/or public sector experience?
A. Check the POC table (Table 2.0) on page 7.

Q. What if I do not like the registrar audit team or team leader?
A. RAB says that your registrar must inform you of the names of your audit team members in time for you to appeal against the appointment of any particular auditor. So, if for some reason, you do not feel like the assigned auditor is the right one for your organization, let your registrar know as soon as possible.

During Registration:
Q. What happens if I disagree with a finding made by the registrar?
A. As noted above, accredited registrars are required to have procedures or policies to address dispute resolution. Ask your registrar about this process before the audit begins.

Q. What happens if the auditor finds a regulatory noncompliance during the registration audit?
A. Good question! First of all, it does not mean that you have automatically failed the audit. If your registrar identifies a noncompliance, RAB says that you may still become registered if your EMS addresses such noncompliances and when taken into consideration, the noncompliances do not indicate a major nonconformance with ISO 14001 requirements. The auditor is not there primarily to determine if you are in compliance, but rather to determine if you are adequately managing your compliance obligations as part of your EMS.

The best way to ensure that your EMS is adequately managing compliance issues is to: 1) Be knowledgeable about all federal, state, and local environmental and legal requirements; 2) Undertake periodic assessments of your own compliance; 3) Have procedures in place to identify and respond to instances of noncompliance, including procedures to identify the root causes of noncompliance to ensure they do not reoccur.

Your accredited registrar is required to have methods for handling and reporting any discoveries of noncompliance so be sure to ask how they would handle this situation if it arises.

After Registration:
Q. Once I have successfully completed the audit and become registered to ISO 14001, what is next? Are follow-up audits required?
A. Yes, follow-up audits, called surveillance audits, are required and are another strength of the third-party audit system. The required surveillance after you achieve registration is another strength of the third-party system. Surveillance helps to ensure that your EMS stays in conformance with ISO 14001 and that it is continually improving. Under RAB's requirements you have two options for surveillance:

1. A six-month surveillance cycle with no re-audit after three years, or
2. An annual surveillance with a re-audit after three years. With either option, the number of audit days/year is the same, except for the re-audit. For example, you can choose to have your auditor on site for two days once a year or for one day twice a year. There are pros and cons for each option.

Q. Can I lose my registration?
A. Yes you can, but if you diligently address all issues identified during the surveillance audits in order to maintain and improve your EMS, this is unlikely to occur.

Section 5: Maintaining Your EMS

Congratulations! You have developed an EMS at your wastewater facility and have successfully completed the initial audit of your system. You have established a clear policy that sets the stage for your EMS, thoroughly analyzed your environmental "footprint," and set measurable objectives and targets for your EMS. You have also trained your employees on their responsibilities under the EMS, modified a number of operational procedures and controls, performed an internal audit of the system, and conducted at least one management review. It is now time to maintain and update the EMS foundation that you put in place.

As part of maintaining and improving the groundwork that you put in place, you will be testing, reviewing, and updating your EMS policy and procedures, continuing to train and communicate with employees and the public, reviewing your environmental impacts, and checking and improving your system through internal audits and management reviews. Also, you will continue to maintain the enthusiasm and buy-in from employees, the public, and management by tracking and reporting on the performance and benefits of your EMS.

The table below presents the stages of EMS development, from developing and implementing your system, to engraining the EMS as the way you do business.

The Stages of EMS Development[1]

	-- Beginning -- EMS Under Development	-- Deploying -- EMS Registered/In Conformance	-- Maturing -- EMS as a Business Practice
Timeline	0-2 years	2-5 Years	5+ Years
Goals	Develop an EMS - build on policies, procedures, and programs that are in place Complete initial third party audit	Strengthen linkages among the EMS elements Demonstrate the performance and (cost) benefit of the EMS, both internally and to key stakeholders	Continue to define and meet stakeholder needs Achieve/maintain high level of environmental performance and demonstrate real business value
Activities	Strengthen compliance and other programs Understand ISO 14001 requirements and the systems approach Learn how to communicate the EMS to the public; train employees Building foundation policies, procedures, and programs	Use the EMS to integrate and align existing programs and systems: • quality/health & safety • Asset Mgmt., CMOM, QualServ • resource allocations • operational controls • information and support systems • training • communication and reporting Continue to develop and enhance metrics for EMS and other performance tracking	Improve efficiency through process improvement • Streamline systems • Consolidate documentation Include EMS and other environmental data in the strategic planning process and in daily business decisions Tracking of nonconformances with emphasis on prevention ("find, fix, and prevent"). Corrective/preventive action process is well established.
Characteristics	Energy/resource intensive Management provides resources, but direct involvement may be limited Use available or very simple metrics to measure EMS performance	Corrective (and particularly preventive) action processes in development EMS is still being refined Focus is still on the present, not the future EMS is becoming part of the business process Cultural change starting Management understanding and use of EMS in key decisions increases	High level of management involvement EMS serves as a launch pad for new environmental initiatives Use of environmental metrics is well established, metrics continue to improve, and clearly support business goals 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

[1] Adapted from NSF International

Section 6: Conclusion

In this Handbook, we have attempted to give other wastewater agencies and public entities a clear sense of the steps needed to put an effective EMS in place, based in large part on the experiences of agencies that have successfully done so and are now seeing the benefits of their efforts. Clearly, there is much more information that could be provided, but one of the strengths of this project is the enthusiasm of these agencies and their willingness to share information and insights with their colleagues. With this in mind, we urge you to contact these individuals for more information as you develop your own EMS. They are the true "experts." Here is their contact information:

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Environmental Health & Safety Coordinator
City of Eugene, Wastewater Division
410 River Road
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Appendix A
EMS Sample Documentation

I.   **Environmental Policy**

II.   **Legal & Other Requirements**

III.   **Environmental Aspects And Impacts**

IV.   **Objectives and Targets**

V.   **Environmental Management Programs**

VI.   **Training**

VII.   **Internal & External Communication**

VIII.   **Document Control And Record Management**

IX.   **Environmental Management System (EMS) Manual**

X.   **Operational Control**

XI.   **Emergency Preparedness**

XII.   **Monitoring And Measurement**

XIII.   **EMS Internal Audit**

XIV.   **Nonconformance And Corrective Action**

XV.   **Management Review**

SAMPLE EMS DOCUMENTATION

ENVIRONMENTAL POLICY

Charleston CPW – Environmental Policy
City of San Diego WWC – Environmental Policy
Kent County DPW – Environmental/Biosolids Policy

Commissioners of Public Works

4.2 - Environmental Management System – Environmental Policy Statement

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The Charleston Commissioners of Public Works (CPW) is committed to the improvement of the environment for present and future generations through:

- The treatment and delivery of safe potable water.
- The collection, treatment, and proper disposal of wastewater.
- The responsible impact of its activities, products and services on the environment.
- The continual environmental improvement and the prevention of pollution.
- Compliance with all applicable federal, state, and local laws, regulations, statutes and other environmentally related requirements to which the organization subscribes.
- The establishment of environmental objectives and targets that are periodically reviewed to ensure success.
- And communication of its Environmental Management System to CPW associates and to other interested parties.

CPW will establish and maintain an Environmental Management System (EMS) that corresponds to the ISO 14001 Standard and the mission, vision, strategic business plan and core values adopted by CPW.

_____   _____

William Koopman, Jr.,   John Cook, PE,
General Manager   Assistant General Manger

_____   _____

Kin Hill, PE,   Dorothy G. Harrison,
Director of Operations   Director of Administrative Services

METROPOLITAN WASTEWATER DEPARTMENT
WASTEWATER COLLECTION DIVISION

ENVIRONMENTAL POLICY

The Wastewater Collection (WWC) Division of the City of San Diego Metropolitan Wastewater Department is committed to providing safe and effective sewer maintenance services in a responsible and pro-active manner. A central mission of the WWC Division is to prevent discharges to waters of the U.S., protect local riverine and coastal resources and public health, support Departmental strategic goals and meet regulatory agency standards at the lowest possible cost.

In fulfilling this commitment, it is the policy of the WWC Division to:

- continually improve the Division's work processes and practices, communicate its efforts to protect environmental health and public safety to interested stakeholders, and effectively manage or minimize impacts to San Diego's urban and coastal environment;

- comply with legal and regulatory requirements applicable to the Division, as well as with other voluntary standards to which we subscribe; and,

- prevent environmental pollution that may be attributable to WWC Division operations, and otherwise seek to minimize waste and impacts to natural resources.

In keeping with this policy, the WWC Division will establish and maintain an Environmental Management System that provides a framework for setting, and periodically reviewing, the WWC Division's environmental objectives and targets for each of its processes, services and/or activities.

This policy is communicated regularly to all WWC Division staff and will be made available to regulatory agencies, the general public, or other interested parties upon request.

KENT COUNTY LEVY COURT POLICY

POLICY NUMBER:	E-6 PAGE 1 OF 1 PAGE(S)
SUBJECT:	Environmental/Biosolids Policy
ADOPTION DATE:	December 9, 2003
EFFECTIVE DATE:	December 9, 2003
SUPERCEDES:	N/A
SUPPLEMENTS:	N/A

The Kent County Levy Court commits to reduce the impact of its operations on the environment, by adopting the International Organization for Standardizations ((ISO) 14001 Environmental Management Systems standards, and the National Biosolids Partnership (NBP) Code of Good Practice for the wastewater collection and treatment facility operations directed by the Department of Public Works. In addition, the Levy Court requires all Public Works contractors employed at the covered facilities to abide by this policy.

The Levy Court commits to:

- Comply with all applicable environmental laws and regulatory requirements, to the NBP Code of Good Practice and any other requirements to which the organization subscribes;
- Have an environmental and biosolids vision and mission, then develop/achieve the objectives and targets to implement this mission;
- Improve continuously, through the EMS, management of our environment, our wastewater effluent and our biosolids product;
- Readily share our wastewater operations and biosolids information with interested stakeholders; and
- Practice daily pollution prevention activities.

This policy is communicated to all Kent County employees and the general public.

DRAFTED BY:	Kent County Department of Public Works Environmental Management Systems Core Team
REVIEWED BY:	Global Environmental and Technology Foundation for the US EPA and the Sewer Advisory Board
DATE SUBMITTED:	December 9, 2003

SAMPLE EMS DOCUMENTATION

LEGAL AND OTHER REQUIREMENTS

Charleston CPW – Handling of Legal Requirements Procedure
City of Gastonia WWTP – EMS/Legal and Other Requirements Review Standard Operating Procedure
City of San Diego WWC – Regulatory Tracking and Analysis Procedure

CPW ENVIRONMENTAL MANAGEMENT SYSTEM
PROCEDURE

The on-line version and secured hardcopy are the controlled documents. The secured hardcopy will be identified by an "Official Document" stamp giving date of distribution. Any and all other documents are uncontrolled. Contact the EMS Program Manager for revision level status.

Effective Date:	**October 1, 2000**	**Page 1 of 3**
Revision: 2	**Identification Number: EMS – 4.3.2**	
Title:	**Handling of Legal Requirements Procedure**	
Prepared By:	**EMS Procedures Subcommittee**	
Reviewed By:	**EMS Management Steering Committee**	
Approved By:	**William E. Koopman, Jr., General Manager**	
	John Cook PE, Assistant General Manager	
Date Approved:	**August 25, 2000**	

0.0 Requirement   ISO 14001; Sub Clause 4.3.2

1.0 Purpose

This document describes the procedure to be followed for accessing and tracking regulatory and other legal requirements.

2.0 Scope

This procedure is used to facilitate tracking of legal requirements and to assist departments in the maintenance of regulatory compliance applicable to ISO 14001 Environmental Management System activities, products, or services.

3.0 Responsibility & Authority

3.1 Sections heads and departments heads are responsible to identify and analyze environmental regulations and other legal requirements relevant to their activities, products or services and communicating this information to the associates within their section or department.

3.2 It is the responsibility of all associates to comply with the regulations.

4.0 Procedure

4.1 Determination of the Type of Regulatory Requirement to be Identified
Each department shall identify the relevant environmental laws, regulations and industry standards CPW adheres to. This may include international, federal, state, regional and local regulations. Types of regulatory requirements to be identified include environmental legislation that covers the protection of air, water, land, natural resources and humans.

4.2 Impacts
A listing of major areas of the environment impacted by the department operation; that is, air, water, soil, flora, fauna, and human (such as Risk Management) will be made. The list will also include major types of wastes or products that the operation generates or utilizes such as domestic waste, chemical waste, waste oils, hazardous waste, paper, metals, glass, and so forth.

4.3 Agency Lists
A check of agency lists will be made. If the departmental operation impacts a component of the environment or generates waste, the corresponding agency should be consulted for regulatory requirements that may apply.

4.4 Regulatory Services
A regulatory service, library, or regulatory contact (such as South Carolina Department of Health and Environmental Control) will be made to get a copy of relevant environmental regulations. All levels of government will be checked to see if there are regulatory requirements impacting departmental operations.

4.5 New Project or Change to Existing Operation
Each department shall review environmental requirements prior to the initiation of a new project or modification of an existing operation. The department head will check and coordinate with Design and Construction to ensure applicable city and county codes are identified and met.

4.6 Consulting Engineers and Contractors working on site shall be made aware of this procedure to ensure regulatory requirements are identified and met.

4.7 Organization and Tracking
A listing of regulatory summary sheets, or the regulations themselves, shall be maintained, by paper file or electronically, and updated as necessary.

Effective Date: **October 1, 2000**   **Page 3 of 3**
Revision: 2   **Identification Number: EMS – 4.3.2**
Title: **Handling of Legal Requirements Procedure**

4.8 Each department shall maintain a listing of regulatory requirements, including detailed summary sheets, or the regulations themselves. This listing may be maintained, by paper file or electronically or both and updated as necessary and at least annually. Regulatory listings or summaries should be posted electronically or made easily accessible to other departments.

5.0   Related Documentation

    5.1   Regulations
    5.2   Laws and Acts
    5.3   Regulatory Self Assessment Reports
    5.4   Permits and Permit Applications

EMS/Legal and Other Requirements Review
Standard Operating Procedure

1.0 Purpose

1.1 The following procedure covers various requirements for reviewing areas of the Environmental Management System (EMS). This procedure also provides a process for identifying, reviewing, and maintaining the legal and other requirements documents. Designated levels of management for each area of the EMS will complete the reviews.

2.0 Associated Equipment

2.1 None

3.0 Associated Reference Material

3.1 *ANSI/ISO 14001-1996 Environmental Management Systems – specifications with guidance for use.*

3.2 *City of Gastonia – Environmental Management System Manual (EMS-0100.000)*

3.3 *Legal and Other Requirements document (EMS-0102.001)*

3.4 *National Biosolids Partnership (NBP) EMS Guidance Manual March,2001*

4.0 Procedure

4.1 EMS Manual

4.1.1 The EMS Team will review the EMS Manual, which includes a review of the EMS policy, annually. See EMS Legal and Other Requirements document (EMS-0102.001) reporting section for more specific scheduling. Any required revisions will be reported to the POTW Director for approval and the EMS Coordinator, or designee, will make the appropriate changes.

4.1.2 Any proposed changes to the EMS policy will be reviewed and approved by the City Council as deemed necessary by the Management Review Board (MRB).

4.2 Aspects and Impacts

4.2.1 A review of the aspects and impacts and significance will be conducted annually for existing and new operations. Also, at any time during the year that a process is added or modified. See EMS Legal and Other Requirements document (EMS-0102.001) reporting section for more specific scheduling. Any changes to the current significance list will be updated by the EMS Coordinator, or designee.

4.3 Emergency response plans

4.3.1 A review of the emergency response plans will be conducted semi-annually. See EMS Legal and Other Requirements document (EMS-0102.001) reporting section for more specific scheduling. Any changes will be reported to Division Supervisor for approval. The Division Safety Supervisor will make the approved changes to the plans and forward to the EMS Coordinator, or designee. The EMS Coordinator, or designee, will update the computer network and issue controlled copies using the appropriate distribution lists.

4.4 Quarterly MRB report review

4.4.1 At least quarterly, the MRB will review compliance reports, EMS Improvement Program progress reports, EMS audit results, and any documented corrective actions reports. Any changes to the EMS as a result of these reviews will be approved by the EMS Coordinator.

4.4.2 The MRB will review monthly compliance with existing regulations and the suitability and adequacy of the EMS.

4.4.3 The legal and other requirements for the current quarter being reviewed and the up-coming quarter will be discussed at the quarterly MRB meeting.

4.5 Legal and Other Requirements

4.5.1 At least quarterly, persons listed in the Legal and Other Requirements document (EMS-0102.001) as the responsible party will review the existing legal and other requirements for their area and identify any new or modified items. They are responsible for reporting this information to the EMS Coordinator, or designee, for updating the Legal and Other Requirements document (EMS-0102.001).

4.5.2 This information shall include, but is not limited to, new permit dates, inspection dates, contractor information, regulatory reporting requirements, and review dates of any identified legal and other requirements currently listed.

4.5.3 After the information is updated in the Legal and Other Requirements document, designated supervision in each area will review and approve the changes and send them to the EMS Coordinator, or designee. The EMS Coordinator, or designee, will update the ISO directory and distribute controlled documents as directed by the document control matrix (EMS-0101.000).

4.6 Objectives and Targets

4.6.1 Annually, designated supervisors in each area will review the current list of significant aspects and impacts along with the current objectives and targets and establish a revised list of objectives and targets for the coming year. See EMS Legal and Other Requirements document (EMS-0102.001) reporting section for more specific scheduling.

4.6.2 Any new objectives and targets and/or revisions will be submitted to the designated supervisor in each area for review and approval. The EMS Coordinator, or designee, after receiving approved objectives and targets will enter the revisions onto ISO directory and update the EMS improvement programs.

5.0 Revision History

Revision Date	#	C/PAR #	Reason for Revision	Description of Revision
3/17/03	5	EMS-0084	C/PAR	Added a modification history section
3/17/03	5	EMS-0116	C/PAR	Added NBP requirements as a part of the WWTD's participation in the NBP demonstration group.
3/17/03	5	Clarification of procedure and expansion		Reorganized procedure for clarification purposes and expanded it for the department.

DD-SEOP 4.3.2

REGULATORY TRACKING AND ANALYSIS

1.0   PURPOSE AND SCOPE

The purpose of this procedure is to ensure that the Wastewater Collection Division (WWC) of the Metropolitan Wastewater Department (MWWD) has access to laws, and regulations that apply to its operations.

This procedure covers laws, regulations, and other requirements established at the federal, state and local levels that apply to the operations of WWC Division sections. The WWC Division takes these requirements into consideration when setting its environmental objectives and targets (Reference to DD SEOP 4.3.3, Establishment of Environmental Objectives and Targets).

2.0   DEFINITIONS

Reserved

3.0   RESPONSIBILITY AND AUTHORITY

3.1   The MWWD Environmental Monitoring and Technical Service Division (EMTSD) and Environmental Program Management Division (EPM) are two of several service providers to the WWC Division, as outlined in the Service Level Agreements (SLA). The EMTSD and EPM bear primary responsibility within the overall MWWD for tracking and maintaining updated records and reference documents for environmental laws and regulations as well as environmental permitting requirements.

3.2   WWC Division personnel, including the Deputy Director or each Section Manager will be delegated to disseminate information regarding any changes in regulations that could affect operations or administration.

4.0   PROCEDURE

<u>General</u>

The permitting and other legal requirements applicable to WWC Division operations are determined and routinely monitored by the numerous city organizations, including but not limited to the Metropolitan Wastewater Department Environmental Monitoring and Technical Service Division (EMTSD) Permits and Compliance Division and the Engineering and Program Management (EPM) Division.   Additional regulatory support is provided by other City Departments, regional water enforcement agencies and the U.S. EPA. Such requirements are documented in Section-specific operating permit inspection checklists prepared by the EMTSD Permits and Compliance Section Head, which are distributed to the EMR.

The EMR is responsible for coordinating the update of this information with EMTSD and EPM or in liaison with other appropriate City Departmental or resource agency staff at least once per year or whenever:

- an existing applicable environmental rule or regulation is modified;
- an existing activity, product or service is to be modified; or
- a new activity, product or service is considered.

Compliance with the requirements identified in each section-specific list is verified by or at the direction of the EMR or DD at least annually, as described in Chapter 5, Section 5.1. The EMR maintains access to copies of relevant legislation through contacts with appropriate regulatory agency representatives, libraries, information services, and/or the City Attorney's office.

As detailed in DD SEOP 4.5.4, "Environmental Management System Audits and Compliance Verification", the WWC is responsible for auditing the regulatory compliance status of the Division on a based upon a pre-determined schedule, and providing copies of appropriate inspection check sheets to the EMR, EMTSD or EPM as applicable, with comments.

Follow-up evaluations of regulated status will occur on a bi-annual basis, or will occur sooner if changes in the applicable laws and regulations are identified or significant changes in the operations of WWC Division occur.

4.1   Within MWWD, the EMTSD and EPM share specific responsibilities for tracking applicable environmental laws and regulations and identifying those related to the operations of the WWC Division. The Divisions employ a variety of techniques and information sources to regularly track, identify and evaluate applicable laws and regulations. These include, but are not limited to:

- Federal Government's Federal Register;
- commercial services and databases;
- Internet and WWC Division Intranet web sites;
- the City Attorney's office;
- information made available and provided by trade associations and membership organizations; and
- communications with federal, state and local regulatory agencies and authorities.

4.2   The EMTSD and EPM monitor these information sources on a regular basis i.e. quarterly to ensure that new regulations and issues are identified and managed in coordination with the WWC in a timely manner.

4.3   As necessary, "off-site" resources (e.g., consultants and attorneys) may be called upon to assist in evaluating applicable laws and regulations or in developing programs in response to applicable laws and regulations. Where off-site resources are used for this purpose, the EMTSD and/or EPM is responsible for coordinating the effort with appropriate WWC Division staff.

4.4   The EMTSD, EPM and Section Managers disseminate information on applicable laws and regulations (and the adherent potential impacts of the activities, processes, operations conducted by the WWC Division) to appropriate personnel. The determination of which personnel must be informed and the method for providing the information is at discretion, based on the circumstances of each situation.

4.5   The EMTSD and EPM compile and maintain copies of significant applicable environmental laws and regulations. Where copies of such laws and regulations are not maintained at the Section Head's offices, EMR will ensure that ready access is available from other sources (i.e., the other sources listed in Item 2 above).

4.6   If periodic site audits (i.e., planned environmental inspections, general environmental compliance audits, ISO 14001 environmental management system audits, etc.) or management reviews indicate or identify additional laws and regulations must be tracked and evaluated, the EMR ensures that these activities take place.

4.7   The EMR will ensure that appropriate changes are developed and implemented in cases where new environmental regulations, Division environmental policies and/or industry standards could affect the continued performance of the ISO 14001 environmental management system.)

5.0   REFERENCES

WWC Division Environmental Management Plan
        Section 3.1, Environmental Aspects
        Section 3.2, Legal Requirements
        Section 3.3, Objectives and Targets

DD-SEOP 4.3.1, Environmental Aspects and Impacts Identification

DD-SEOP 4.3.3, Establishment of Environmental Objectives, Targets and Programs

DD-SEOP 4.5.4, Environmental Management System Audits and Compliance Verification

SAMPLE EMS DOCUMENTATION

ENVIRONMENTAL ASPECTS AND IMPACTS

Kent County DPW – Determination of Significant Aspects Procedure
Kent County DPW – Significant Aspect List
Rivanna Sewer and Water Authority – Significant Aspect List

CONTENTS

1.0   PURPOSE

1.1   The purpose of this procedure is to establish the general requirements for the work process of determining the significant environmental aspects that are applicable to the Kent County Dept. of Public Works Regional Wastewater Treatment Facility.

1.2   The purpose of this work process is to establish the Kent County Dept. of Public Works specification for determining the significant environmental aspects that apply to the facility to facilitate compliance with the applicable requirements.

2.0   SCOPE

2.1   This procedure addresses the determination of significant environmental aspects applicable to the Kent County Dept. of Public Works Environmental Program.

3.0   DEFINITIONS

3.1   Activity – Something that occurs at the wastewater facility in order to transport wastewater, or produce clean wastewater or Kentorganite.

3.2   Critical Control Point – An environmental aspect that is considered critical to ensuring a quality biosolids product as required under the National Biosolids Partnership (NBP) EMS program.

3.3   Environmental Aspect – The element of any activity, as defined above, that interacts with the environment. An aspect is the element that causes the impact to the environment from any activity that occurs at the wastewater facility, examples, include burning fuel, used oil recycling, etc.

3.4 *Environmental Impact* – Any change to the environment, either positive or negative, wholly or partially resulting from the wastewater facility's activities. An impact is the effect of any aspect with respect to the environment. Examples include degradation of air or water quality, depletion or conservation of natural resources, etc.

3.5 *Frequency/Probability* – The number of times an environmental aspect occurs (e.g., daily, monthly, yearly, infrequently, etc.) or the likelihood of the aspect occurring (very, not very).

3.6 *Input/Output (I/O) Charts* – Diagrams used to describe activities that occur at the wastewater facility. Each diagram presents the activity, key resources needed by the activity, products and byproducts of the activity, and wastes generated by the activity.

3.7 *Significant Environmental Aspect* – An environmental aspect that the Core Team has determined to be serious enough to be included in the EMS program's objectives and targets in order to ensure that it is properly controlled.

4.0 REFERENCES

4.1 Kent County Dept. of Public Works Environmental Management System Program Manual

5.0 REQUIREMENTS

5.1 *Identifying Activities*

Each activity that occurs at the Kent County Regional Wastewater Treatment Facility shall be identified to its smallest or most manageable component in order to ensure that all potential environmental impacts are considered. The activity shall be a subset of the main activities presented in the I/O chart presented as Attachment A.

5.1.1 Each area manager shall identify all activities that occur under his/her direction. The list shall be maintained as Appendix A to this procedure.

5.1.2 Each area manager shall present the activity as a completed I/O chart and submit them to the EMS Core Team for review. All completed charts shall be presented as Appendix B to this procedure.

5.1.3 Area managers shall use operations personnel to assist in the preparation of the I/O charts for their area. As an option, each area manager shall ask all operations personnel to list five (5) activities that they routinely perform. The list shall be prepared and consolidated by the Core Team

5.2 Identifying Aspects

The EHS Core Team shall conduct a review of the I/O charts for each area and determine with consultation of the area managers and operations personnel the aspects associated with the each chart. The aspects shall be listed on the aspect table presented as Attachment C. All completed aspect tables shall be presented as Appendix C to this procedure.

5.3   Identifying Impacts

For each aspect presented on the Table included as Attachment C, an environmental impact shall be assigned. This shall be based on impacts in one of the following areas:
- Changes in air quality
- Changes in water quality
- Direct exposure to agent
- Changes in habitat
- Nuisance (including odor)
- Conserves/depletes resources
- Frequency/Probability
- Is it regulated
- Is it a critical control point

5.4   *Determining Significance*

The EMS Core team shall determine the significance of each environmental aspect by using best professional judgment with respect to the impacts associated with each aspect, assigning a value from 0-5 for each aspect (with 0 being no impact, and 5 being major impact). The value assigned for the aspect shall be the value that represents the average of all of the values determined by the Core Team for that aspect. A regulated activity will receive a rating of 5 and an unregulated activity will receive a rating of 0. A critical control point (CCP) will receive a rating of 3, while an activity that is not a CCP will receive a rating of 0. A ranking shall be prepared and presented to the Core Team by the Environmental Program Manager for all aspects evaluated in this manner. The Core Team shall meet to evaluate the final rankings of all environmental aspects, and determine which of these shall be designated "significant." The prioritized list shall be maintained as Appendix D to this procedure.

6.0   RESPONSIBILITIES

6.1 Determining the activities, preparing the I/O charts, and completing the environmental aspect tables shall be the responsibility of the area managers for the facility with the EMS Core Team providing quality control.

6.2 The EMS Core Team shall develop the significance criteria for all identified environmental aspects under the direction of the Environmental Program Manager, and assign the final rankings for all environmental aspects. The criteria shall be set such that no more than 6-8 aspects shall be given the ranking of "significant".

6.3 The Environmental Program Manager will publish the prioritized list of significant aspects as an appendix to this procedure and ensure that it is current.

6.4 The significant aspect list will be reevaluated yearly and compared against the list of objectives and targets to determine if new objectives and targets are required and whether the current list of significant aspects supports the current objectives and targets.

7.0 DOCUMENTS

7.1 *Related Documents*

None

8.0 RECORDS

8.1 *Required Records*

The list of activities; the list of aspects, and the priority list of aspects shall all be maintained as appendices to this procedure.

8.2 *Records Control*

All records, if required, pertaining to this procedure shall be controlled in accordance with the Environmental Management System Procedures 2-11-P02, Controlling Records, and 2-10-P02, Confidentiality.

9.0 ATTACHMENTS

9.1 *Attachment A* - Diagram of major activities associated with the wastewater facility.

9.2 *Attachment B* - Blank I/O diagram

9.3 *Attachment C* - Blank aspect table

10.0 APPENDICES

10.1 Appendix A – List of all identified activities associated with the Kent County regional wastewater treatment facility.

10.2 Appendix B – Completed I/O charts associated with the activities listed in Appendix A.

10.3 Appendix C – Aspect tables provided for each of the activities listed in Appendix A.

10.4   Appendix D – Prioritized list of aspects as determined following the significance criteria presented in Section 5.4.

11.0   <u>REVISION HISTORY</u>

Revision No.	Effective Date	Responsible Person	Description of Revision	Appv. By
0		Jim Newton	Initial Issue	

ATTACHMENT A

Wastewater Treatment Plant

Resources

Wastewater

Air

Electricity

Heat

Products

Treated Wastewater

Kentorganite

Byproduct

Wastewater Collection

Wastewater Operations

Maintenance

Pretreatment

Biosolids Operations

Ag Operations

Waste

Heat

Spills

Air emissions

Solid wastes
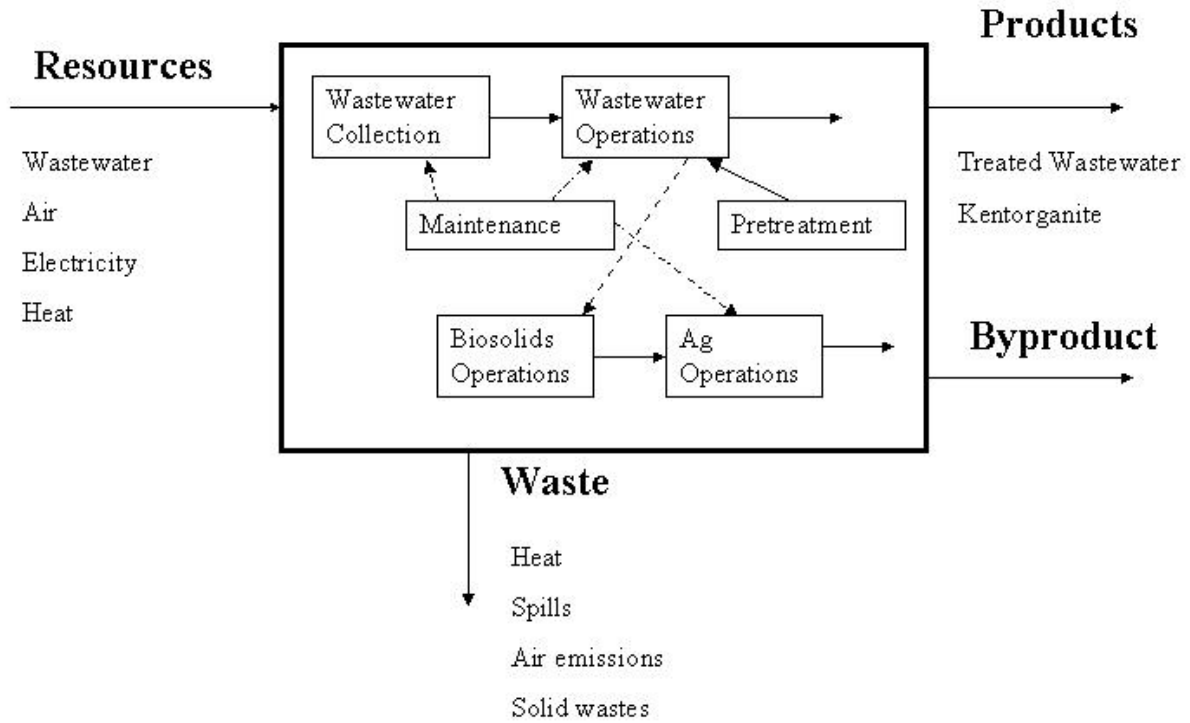
ATTACHMENT B
INPUT/OUTPUT CHART

Resources →

ACTIVITY

Products →

Byproducts →

Wastes ↓
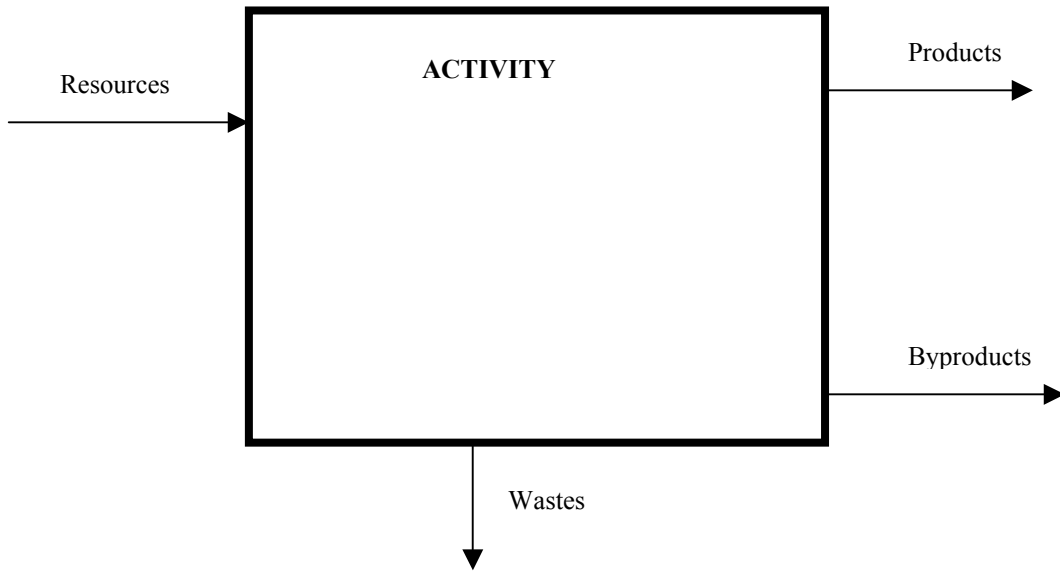
ATTACHMENT C

BLANK ENVIRONMENTAL ASPECT CHART

Dept/Area/Operation	Activity	Environmental Aspects	Changes Air Quality	Changes Water Quality	Direct exposure to agent	Changes Habitat	Nuisance	Depletes Natural Resource	Regulated	Critical Control Point	Frequency/Probability	Total Environmental Score	Significant	Operational Control(s)

Org/Operation:
Aspects and Impacts Worksheet

Operation:

Dept/Area/Operation	Activity	Environmental Aspects	Env. Impacts									Sig.		Operational Control(s)
			Changes Air Quality	Changes Water Quality	Direct exposure to agent	Changes Habitat	Nuisance (odor, etc.)	Depletes Natural Resource	Regulated?	Critical Control Point?	Frequency/Probability	Total Environmental Score	Significant?	
Ag Ops - Applying Kentorganite	Spreading of Kentorganite	Dust, odor, fuel, air pollution	3	1	3	2	4	3	5	3	4	28	Y	
Biosolids - Drying	Run scrubber	Air pollution, electricity, spills, leaks	4	2	1	1	3	2	5	3	5	26	Y	
Biosolids - Drying	Run boilers	Electricity, fuel, air pollution	4	1	1	1	2	3	5	3	5	25	Y	
Ag Ops - Applying Kentorganite	Spills of Kentorganite	Lime usage, fuel, solid waste, oils	4	1	5	0	5	0	5	3	1	24	Y	
Maintenance - Force Mains	Spill mitigation	Lime usage, fuel	2	3	4	3	3	3	5	0	1	24	Y	
Biosolids - Drying	Run dryers	Electricity, Dowtherm, spills, drums, leaks	4	1	2	1	1	2	5	3	5	24	Y	
Operations - Chlorine Addition	Connecting chlorine containers	Chlorine leak,	5	2	5	2	4	3	0	0	3	24	Y	
Maintenance - Pump Station	Spill mitigation	Lime usage, fuel	3	4	4	2	3	2	5	0	1	24	Y	
Operations - Air Compressors	Operating blowers	Electricity, air pollution, noise, fuel	4	4	1	1	3	5	0	0	5	23		
Operations - Laboratory	Sample Analysis	Electricity, fuel, chemicals, air pollution, solid and hazardous waste, water, paper, spills	2	3	4	0	2	3	0	3	5	22		
Maintenance - Pump Station	Emergency generator maintenance	Fuel, electricity, air pollution	4	1	1	1	3	2	5	0	3	20		
Biosolids - Dewatering	Preventive maintenance	Fuel, electricity, rags	2	1	3	2	4	2	0	3	3	20		
Maintenance - Safety	Confined Space entry	Electricity, air pollution, rags, fuel usage	3	2	4	1	4	3	0	0	3	20		
Operations - Aeration Basins	Air diffusing	Electricity, air, air pollution	4	2	0	0	2	4	0	3	5	20		
Ag Ops - Applying Kentorganite	Loading of Kentorganite	Fuel, dust, air pollution, odors, spills	3	1	2	0	4	3	0	3	4	20		
Ag Ops - Applying Kentorganite	Off loading Kentorganite	Dust, fuel, spills, air pollution	3	1	2	1	4	1	0	3	4	19		
Operations - Clarifiers	Emergency generator operations	Electricity, fuel, noise air pollution	3	1	0	0	1	1	5	3	5	19		
Operations - Sulfur Dioxide Addition	Connecting sulfur dioxide containers	Sulfur dioxide leak	3	1	4	2	3	3	0	0	3	19		

Operation:

Dept/Area/Operation	Activity	Environmental Aspects	Changes Air Quality	Changes Water Quality	Direct exposure to agent	Changes Habitat	Nuisance (odor, etc.)	Depletes Natural Resource	Regulated?	Critical Control Point?	Frequency/Probability	Total Environmental Score	Significant?	Operational Control(s)
Operations - Chlorine Addition	Monitoring/controlling chlorine addition	Chlorine leak,	4	1	4	1	2	2	0	0	5	19		
Operations - Chlorine Addition	Repairing chlorine equipment	Chlorine leak,	4	1	4	2	4	2	0	0	2	19		
Maintenance - Pump Station	Pump/Motor maintenance	Electricity, spills, rags	2	1	3	0	4	2	5	0	2	19		
Operations - Inflow	Odor scrubbing	Solid waste, electricity, water, chemicals	3	0	2	0	3	1	5	0	5	19		
Operations - Sulfur Dioxide Addition	Preventive maintenance	Sulfur dioxide leak	3	1	4	2	3	2	0	0	3	18		
Operations - Sulfur Dioxide Addition	Monitoring/controlling sulfur dioxide addition	Sulfur dioxide leak	3	1	4	1	2	2	0	0	5	18		
Maintenance - Pump Station	Bar screen maintenance	Electricity, fuel, landfill of waste grease and rags, air pollution	3	1	4	1	5	1	0	0	3	18		
Biosolids - Drying	Run scrubbers	Electricity, air pollution, spills, water	3	2	0	0	1	2	5	0	5	18		
Operations - Air Compressors	Emergency generator operation	Fuel, electricity, noise	2	2	0	0	1	2	5	3	2	17		
Operations - Air Compressors	Preventive maintenance	Electricity, solid waste	1	2	0	0	1	2	5	3	3	17		
Maintenance - Force Mains	Force main cleaning	Pig material, fuel, electricity, solid waste	2	2	4	2	3	2	0	0	2	17		
Operations - Chlorine Addition	Receiving chlorine containers	Leaking chlorine,	3	1	4	2	3	2	0	0	2	17		
Maintenance - Pump Station	Wetwell maintenance	Fuel usage, grease, landfill of rags, chemical usage, air pollution	3	2	4	1	4	1	0	0	2	17		
Operations - Chlorine Addition	Cleaning chlorine contact chamber	Chlorine, solid waste, skin contact	2	1	4	1	2	1	5	0	1	17		
Maintenance - Force Mains	Hydrogen peroxide operation	Chemical usage, air pollution, spills	1	1	2	1	1	3	5	0	3	17		
Operations - Clarifiers	RAS Pumping	Water, electricity	1	4	0	0	1	2	0	3	5	16		
Maintenance - Force Mains	Gravity/lateral inspection repair	Wastewater, spills, air pollution, fuel	1	2	4	2	3	2	0	0	2	16		
Operations - Sulfur Dioxide Addition	Receiving sulfur dioxide containers	Sulfur dioxide leak	3	1	3	2	3	2	0	0	2	16		
Maintenance - Force Mains	Sewer/ vacuum truck operation	Wastewater, spills, air pollution, fuel	3	2	3	1	3	2	0	0	2	16		
Maintenance - Force Mains	Air relief valves inspection and repairs	Fuel, air pollution, grease, rags, chemicals, lime	2	1	3	1	4	2	0	0	3	16		
Maintenance - Pump Station	Air scrubber maintenance	Electricity, carbon, spills	1	1	2	1	2	1	5	0	3	16		

Operation:

Dept/Area/Operation	Activity	Environmental Aspects	Changes Air Quality	Changes Water Quality	Direct exposure to agent	Changes Habitat	Nuisance (odor, etc.)	Depletes Natural Resource	Regulated?	Critical Control Point?	Frequency/Probability	Total Environmental Score	Significant?	Operational Control(s)
Ag Ops - Building and Grounds	Herbicide application	Fuel, chemical, solid/hazardous waste, water, spills	2	2	2	3	0	1	5	0	1	16		
Operations - Aeration Basins	Preventive maintenance	Electricity, solid waste, fuel	1	1	5	0	1	1	0	3	3	15		
Maintenance - Pump Station	Process controls/SCADA	Electricity, water, rags	1	1	2	0	3	1	0	3	4	15		
Operations - Clarifiers	WAS Pumping	Water, electricity	1	3	0	0	1	2	0	3	5	15		
Pretreatment	Take samples	Spills of samples, waste paper due to chain of custody forms	0	1	1	0	0	0	5	3	5	15		
Maintenance - Pump Station	Bypass/Godwin Tanking	Spills, fuel usage, water transportation, electricity, air pollution	2	3	3	0	3	2	0	0	2	15		
Maintenance - Safety	Trench digging	Electricity, air pollution, rags, fuel usage, spills, contaminated water	2	1	4	2	3	1	0	0	2	15		
Operations - Clarifiers	Tank cleaning	Wastewater, fuel, electricity	3	3	4	0	2	2	0	0	1	15		
Biosolids - Dewatering	Run belt presses, conveyors	Electricity, water, spills, trash, belts	3	1	1	0	1	0	0	3	5	14		
Operations - Inflow	Filter screening	Solid waste, electricity, water	1	3	1	0	3	1	0	0	5	14		
Operations - Aeration Basins	Skimming floatable	Solid waste, fuel	0	3	2	0	3	1	0	0	5	14		
Pretreatment	Review Camera and Card Key Results	Fuel related to transportation to pump station sites, air pollution from vehicles	2	1	1	0	0	0	5	0	5	14		
Biosolids - Drying	Move Kentorganite	Fuel, air pollution, oil	2	1	1	1	0	1	0	3	4	13		
Biosolids - Dewatering	Dose ferric chloride	Electricity, spills, waste ferric chloride	1	1	3	0	0	0	0	3	5	13		
Biosolids - Dewatering	Convey cake to dryers	Electricity, wash down water, spills	2	1	1	0	1	0	0	3	5	13		
Operations - Grit Removal	Removal of grit	Solid waste, electricity, fuel	1	2	1	0	3	1	0	0	5	13		
Ag Ops - Fueling Operations	Filling fuel tanks	Air pollution, spills, electricity	2	1	2	1	2	2	0	0	3	13		
Pretreatment	Transport Sample	Fuel related to transportation, potential spills, air pollution from vehicles	2	1	1	0	0	0	0	3	5	12		
Biosolids - Drying	Run conveyors	Electricity, wash down water, spills	1	2	0	0	1	0	0	3	5	12		
Biosolids - Dewatering	Mix polymer and Dose biosolids	Electricity, spills, trash, waste chemicals	1	1	2	0	0	0	0	3	5	12		
Pretreatment	Issue SIU Permits	Generate paper and waste paper, electricity and ink for computers	1	0	0	1	0	1	5	3	1	12		
Operations - Grit Removal	Preventive maintenance	Solid waste, electricity	0	1	1	0	0	1	0	3	5	11		
Maintenance - Safety	Outside contractors	Electricity, fuel, spills, air pollution	1	1	2	1	3	1	0	0	2	11		
Ag Ops - Vehicle Maintenance	Service vehicles	Air pollution, rags, paper, electricity, spills, solid waste	1	1	1	0	1	3	0	0	4	11		
Ag Ops - Building and Grounds	Pesticide application	Fuel, chemicals, water, solid/hazardous waste, spills	2	2	2	3	0	1	0	0	1	11		
Operations - Inflow	Preventive maintenance	Solid waste, electricity	0	2	1	0	0	1	0	3	3	10		
Maintenance - Force Mains	Preventive maintenance	Electricity, oil and grease rags, fuel	1	1	1	1	1	1	0	0	4	10		
Operations - Inflow	Scum removal	Solid waste, electricity, water, chemicals	1	1	1	0	1	1	0	0	5	10		
Operations - Clarifiers	Flow balancing	Electricity, air pollution	1	2	0	0	1	1	0	0	5	10		
Operations - Laboratory	Sampling	Fuel, electricity	0	0	3	0	1	1	0	0	5	10		
Ag Ops - Fueling Operations	Fueling vehicles	Air pollution, spills, electricity, paper	2	1	1	0	1	2	0	0	3	10		

Org/Operation:
Aspects and Impacts Worksheet

Operation:

Dept/Area/Operation	Activity	Environmental Aspects	Changes Air Quality	Changes Water Quality	Direct exposure to agent	Changes Habitat	Nuisance (odor, etc.)	Depletes Natural Resource	Regulated?	Critical Control Point?	Frequency/Probability	Total Environmental Score	Significant?	Operational Control(s)
Operations - Chlorine Addition	Preventive maintenance	Chlorine	2	0	1	1	1	1	0	0	3	9		
Administration	HVAC of Buildings	Fuel, electricity	3	1	0	0	0	2	0	0	3	9		
Operations - Sulfur Dioxide Addition	Repairing sulfur dioxide equipment	Sulfur dioxide leak	2	0	1	1	1	1	0	0	2	8		
Pretreatment	Conduct public relations	Fuel related to transportation to sites, air pollution from vehicles, waste paper, electricity and ink for computers	2	0	1	1	0	1	0	0	3	8		
Pretreatment	Sample Haulers	Fuel related to transportation, potential spills, air pollution from vehicles	2	1	1	0	0	0	0	0	4	8		
Pretreatment	Analyze Samples	Waste paper, electricity and ink for computers	1	0	0	1	0	1	0	0	5	8		
Ag Ops - Applying Kentorganite	Delivering Kentorganite	Fuel, air pollution, spills, dust	2	1	0	0	1	0	0	0	4	8		
Biosolids - Drying	Preventive maintenance	Fuel, electricity, rags	1	1	0	0	1	1	0	0	3	7		
Pretreatment	Administer Program	Waste paper, electricity and ink for computers	1	0	0	1	0	1	0	0	4	7		
Ag Ops - Applying Kentorganite	Public relations	Fuel, paper	2	0	1	0	0	0	0	0	4	7		
Ag Ops - Vehicle Maintenance	Heat shop	Air pollution, electricity, LP gas	1	0	0	0	1	2	0	0	3	7		
Pretreatment	Set up samples	Wash jars and samplers, add preservatives, potential spills of preservatives	1	2	1	0	1	0	0	0	1	6		
Maintenance - Safety	Rigging and Bracing Operations	Electricity, spills, grease, oil, rags	1	0	2	0	0	1	0	0	2	6		
Operations - Clarifiers	Preventive maintenance	Electricity, fuel, solid waste	0	2	1	0	0	1	0	0	2	6		
Maintenance - Pump Station	Preventive maintenance	Electricity, fuel, oil, grease, chemical usage, air pollution	0	0	1	0	1	1	0	0	3	6		
Ag Ops - Building and Grounds	Yard work	Fuel, solid waste, spills	0	0	0	2	0	1	0	0	3	6		
Biosolids - Dewatering	Monitoring of flow/pH	Paper	0	0	0	0	0	1	0	0	5	6		
Ag Ops - Applying Kentorganite	Weighing of Kentorganite	Fuel, air pollution, paper	1	0	0	0	1	0	0	0	4	6		
Pretreatment	Permit Haulers	Waste paper, electricity and ink for computers	1	0	0	1	0	1	0	0	2	5		
Operations - Laboratory	Preventive maintenance	Chemical usage, air pollution, spills, solid waste	0	0	1	0	0	1	0	0	3	5		
Administration	Maintaining files, etc.	Paper, electricity	0	0	0	0	0	2	0	0	3	5		
Ag Ops - Building and Grounds	Building maintenance	Fuel, electricity, solid waste, chemical usage	0	0	0	0	0	1	0	0	4	5		
Ag Ops - Fueling Operations	Spill cleanup	Air pollution, rags, paper, absorbent	1	1	1	0	1	0	0	0	1	5		
Ag Ops - Vehicle Maintenance	Change parts	Electricity, rags, paper	0	0	1	0	0	1	0	0	3	5		
Ag Ops - Building and Grounds	Snow removal	Fuel, salt/sand mixtures, spills	0	0	0	0	0	3	0	0	1	4		

RIVANNA SEWER AND WATER AUTHORITY – CHARLOTESSVILLE, VIRGINIA

8.3   Sample of Environmental Aspect, Impact Identification, and Ranking

Operation: Compost Yard	Activity	Aspect	Env. Impact	Regulated?	Severity of Impact	Duration of Impact	Release to Environment (Air, Worker Exposure	Public Perception	Total	Significant?	Operational Control(s)
	Drying w/ blowers	Fuel/electricity consumption, air emissions, solid waste generation	Depletion of natural resources, degradation of air quality, landfill space	N	1	3	1	1	1	**7**	N	

8.4   Significant Environmental Aspects (Currently for Moores Creek Wastewater Treatment Plant)

Activity	Aspect	Environmental Impact	Operational Control(s)
Wastewater Treatment (Digestion/Flares, Thickening; Screening/grit removal, Primary treatment, clarification, grease removal; Filter press); Compost; Septage Receiving; Rivanna Pump Station Use & Maintenance	Odors	Nuisance	Odor Control Plan (Under Development)
Septage Receiving	Potential spills/Runoff/ Release	Degradation of water quality	VPDES Permit; SPCC Plan; Stormwater Discharge Permit and Pollution Prevention Plan
Pretreatment	Chemical addition	Degradation of water quality	
Chemical handling (receiving)	Potential spills	Water, soil degradation	SPCC Plan; Stormwater Discharge Permit and Pollution Prevention Plan
Wastewater Treatment/Effluent	Water release	Modification of water quality	VPDES Permit
Wastewater collection, transport, and pump (within Plant)	Possible overflows	Degradation of water and soil quality, natural resource depletion, nuisance	
Office Administration--Paper & office supplies use; Recycling; Contract management; Procurement	energy consumption, Solid waste	Landfill use, natural resource depletion	Standard contract language; Recycling Plan; Procurement Policy (all under development)

SAMPLE EMS DOCUMENTATION

OBJECTIVES AND TARGETS

City of Gastonia WWTP – Objectives and Targets Procedure
City of Charleston CPW – Objectives and Targets
City of Eugene WWTP – Objectives and Targets
City of Gastonia WWTP – Objectives and Targets
Kent County DPW – Procedure and Objectives and Targets
Buncombe County MSD – Objectives and Targets

Standard Operating Instruction – EMS-0100.007 Name: Objectives and Targets Procedure	Corresponding Requirements: EMS Manual: 4.3.3 ISO Standard: 4.3.3 NBP Element: 5
Prepared By: Beth Eckert, Environmental / Administrative Manager	Revision Date: 02/13/03 Revision #: 3
Approved By: Beth Eckert, Environmental / Administrative Manager Signature:	Effective Date: 03/01/01 Page 1 of 3

Objectives and Targets
Standard Operating Procedure

1.0 Purpose

1.1 The following procedure provides guidance for the development and review of objectives and targets, and associated improvement programs for the Wastewater Treatment Division.

2.0 Associated Equipment

2.1 None

3.0 Associated Reference Material

3.1 *City of Gastonia – Environmental Management System Manual (EMS-0100.000)*

3.2 *ISO 14001 Standard: ANSI/ISO 14001-1996 Environmental Management Systems – specifications with guidance for use.*

3.3 *National Biosolids Partnership (NBP)– Elements of an Environmental Management System for Biosolids*

3.4 *Objective and Targets Improvement Plan Summary – EMS-0102.007*

3.5 *Improvement Program – EMS-0101.007A-Program ID#*

3.6 *Significant Environmental Aspects – EMS-0101.003D-year-revision#*

4.0 Procedure

4.1 The WWTD will establish and/or revise an objectives and targets list annually, by April 1st of each year, by considering at least the following information:

    4.1.1 Legal and other requirements

    4.1.2 Significant environmental aspects and impacts and critical control points for the current year – *EMS-0101.003D-year-revision#*

    4.1.3 Prevention of pollution

    4.1.4 Product Quality

    4.1.5 Technological options

    4.1.6 Financial, operational, and business requirements

    4.1.7 NBP – Code of Good Practice

4.1.8 Good Neighbor Policy

4.1.9 Authoritative information sources on relevant topics (i.e. WEF Manuals of Practice)

4.1.10 WWTD environmental policy

4.1.11 Views of interested parties – Management Review Board quarterly reports and External communication log books

4.1.12 Progress reports on the previous years objectives and targets

4.2 Objectives and targets may also be amended at other times during the year as a result of new or revised operations, activities, and/or regulations.

4.3 When there are projects that relate to new developments and new or modified activities, products or services; the program shall be amended where relevant to ensure that environmental management applies to such projects.

4.4 Objectives and Targets may be removed from a current list by the Management Review Board (MRB) if circumstances surrounding an objective and target change during the year.

4.4.1 This removal shall take place following a review of its technological and/or economical feasibility by the Division Manager WWT and/or either of the two Assistant Managers. This change shall be documented and explained in a C/PAR.

4.5 Each Objective and Target will be assigned a unique program ID # and an Improvement Plan (EMS-0101.007A – Program ID#) will be developed.

4.5.1 This program shall include:

4.5.1.1 Designation of responsibility for achieving the objectives and targets at each relevant function and level of organization;

4.5.1.2 Means and time-frame by which they are to be achieved.

4.6 The Objective and Target Improvement Summary (EMS-0102.007) and each Improvement Plan must be approved by the Division Manager WWT and budgeting provisions made, where necessary, to accomplish the stated objectives and targets.

4.7 The EMS Coordinator, or designee, is responsible for their maintenance and facilitating their reporting to the Management Review Board (MRB).

5.0 Revision History:

Revision		C/PAR #	Reason for Revision	Description of Revision
Date	#			
5/20/02	1	EMS-0074	External Auditor	Removal of Deviations statement from Level II procedures
5/20/02	1	EMS-0084	C/PAR	Added a modification history section
8/7/02	2	EMS-0116	C/PAR	Incorporated in NBP requirements for element 5 and the NBP element reference for document control linkage as required in revision 5 of the document control procedure
2-13-03	3			Converted Form #: EMS-0101.007 to Reference Chart #: EMS-0102.007. **NO TRAINING REQUIRED**

**Environmental Management System
Summary of Objectives and Targets**

Prepared by: WWCD EMS Progress Team / Senior Supervisors

Approved by/Date: A. Williams / **Feb. 9, 2004**

Purpose/Scope: To identify and communicate environmental objectives and targets based upon consideration of CPW's analysis of operational requirements, significant environmental impacts, regulatory standards and compliance, technological options, financial resources, the views of interested parties and the strategic business plan.

Instructions: Each CPW department and/or group having been identified by the P2 Team, as having significant environmental impacts (and/or impacts which management requires departments to track), shall complete this form. This form is to be updated annually (and retained as a departmental record) and updated thereafter when modifications and/or changes occur in CPW activities, products, and/or services. Results of the activities listed below are to be reported as they occur in the departments Monthly Operating Report (MOR). **Note:** This form may be replicated on a computer or duplicated on a photocopier. The computer copy must look similar to this document and contain the same information.

Aspect Item	Specific Negative Impact *(Enter a brief description.)*	Objective & Target ID/No.	Objective	Target/Performance Indicator	Performance Record
Sewer System Overflows (Significant Aspect)	Contamination of environment	IP-2004.01 (System Cleaning Program)	Reduce the number of sewer system overflows by systematically cleaning designated mainlines.	Clean 556,200' (46,350' monthly ave.) of wastewater collection mainlines on problem and high-risk areas through the 2004-CY. (Ronald Inabinet)	WWCD Monthly Operating Report; Work Orders
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.02 (Closed-circuit Television Inspection Program)	Acquire system condition and critical data for proper asset management.	Perform CCTV inspections on 288,000' (24,000' monthly ave.) on the collection system through the 2004-CY. (Franklin Yates)	WWCD Monthly Operating Report; Inspection reports
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.03 (Mainline Rehab Program)	Rehabilitate existing mainlines to prolong their life and increase efficiency.	Rehab 8000' of wastewater collection mainlines by October 31, 2004. (Franklin Yates)	WWCD Monthly Operating Report
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.04 (Lateral Lining Process)	Rehabilitate laterals utilizing the Cured in Place Process (CIPP).	Rehabilitate 65 laterals using the CIPP process. Complete by Oct. 31, 2004. (Tony Coker)	WWCD Monthly Operating Report; Work orders
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.05 (Infrastructure Repair Program)	Repair defects in the collection system possibly contributing to inflow & infiltration (I & I).	Perform 540 (45 ave. per month) various point and service repairs for 2004-CY. (Tony Coker)	WWCD Monthly Operating Report; Work orders

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Objectives and Targets - Continuation Sheet

This sheet may be used as an attachment to the EMS Objectives and Targets form when additional space is required.
NOTE: This form may be replicated on a computer or duplicated on a photocopier. The computer copy must look similar to this document and contain the same information.

Aspect Item	Specific Negative Impact *(Enter a brief description.)*	Objective & Target ID/No.	Objective	Target/Performance Indicator	Performance Record
Preventive Maintenance	Potential problems with equipment operation resulting in backups and SSOs	IP-2004.06 (Valve Exercising Program)	Ensure all critical valves are in good operation should an emergency occur.	Develop a valve-exercising program. Include drawings delineating valves to operate, SOI(s) & schedule(s). Establish program by May 1, 2004. (Harry McGee)	WWCD Monthly Operating Report; Associated drawings (GIS); Standard Operating Instruction(s); CityWorks scheduling via work orders
Exfiltration	Contamination of waterways	IP-2004.07 (Water Quality Assurance Program)	Identify leaks in collection system resulting in the potential contamination of waterways.	Identify locations where wastewater mains cross waterways and create a GIS map of those locations. Complete by May 1, 2004. Develop an inspection schedule and create work orders in the CMMS by October 31, 2004. (Gregory Daniels)	WWCD Monthly Operating Report; Standard Operating Instruction(s); Work Orders
Emergency Preparedness/ Response	Increased potential for damage to infrastructure, equipment and environment	IP-2004.09 (Flow Control Program)	Develop procedures for redirecting flows during emergency situations.	Develop a flow control program involving valves associated with force mains. Include drawings delineating valves to operate during specified emergencies. Finalize by July 1, 2004. (Harry McGee)	WWCD Monthly Operating Report; Associated drawings (GIS); Standard Operating Instruction(s)
Computerized Maintenance Management System (CMMS)	Potential for maintenance activities to be incomplete; loss of permanent records	IP-2004.10 (Asset Management and Evaluation Program)	Develop a system for evaluating the infrastructure for prioritizing rehabilitation initiatives.	Develop an asset management/evaluation program to include the production of reports identifying system rehabilitation priorities. Accomplish by July 1, 2004. (Chris Hendricks)	WWCD Monthly Operating Report; Standard Operating Instruction(s); Associated standard reports
Training	Lack of intellectual capitol with regard to environmental and	IP-2004.11 (Skills-based Training	Establish improved controls regarding training	Establish procedures & reports for managing the SBT Training database. Accomplish by July 1,	WWCD Monthly Operating Report; Standard Operating

Form No.: P2-4.3.3-001A (2/4/2003)
Page 1 of 1

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Aspect Item	Specific Negative Impact *(Enter a brief description.)*	Objective & Target ID/No.	Objective	Target/Performance Indicator	Performance Record
	operational effectiveness	Improvement Program)	management.	2004. (Susan Roberts)	Instruction(s); Standard training management reports
Operational Evaluations	Improper evaluations resulting in unqualified rehabilitation planning	IP-2004.12 (Pump Station Operational Evaluation Program)	Develop methodologies & criteria for establishing pump station rehabilitation priorities.	Develop formal, logical criteria for determining schedules for pump station rehabilitation. Complete by Aug. 1, 2004. (Harry McGee)	WWCD Monthly Operating Report; Grading Criteria Worksheet; Schedules (if needed)
Air Release Valve PM	Loss of operational & design effectiveness of force mains & pump stations; exfiltration	IP-2004.13 (Air Release Valve PM Program)	Ensure air release valves are working properly.	Establish an air release valve inspection and maintenance program. Complete by Aug. 1, 2004. (Ronald Inabinet)	WWCD Monthly Operating Report; Standard Operating Instruction(s); Inspection and PM schedule
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.14 (I & I Reduction Plan)	Establish a standard methodology for mitigating I & I	Develop a manual and/or SOI(s) for I & I reductions. Include a structured, comprehensive approach to I&I reduction within the document(s), and complete by Sept. 1, 2004. (Franklin Yates)	WWCD Monthly Operating Report; Standard Operating Instruction(s); I & I Manual (if necessary)
Computerized Maintenance Management System (CMMS)	Potential for maintenance activities to be incomplete; loss of permanent records	IP-2004.15 (CMMS Phase-in Project)	Encompass all aspects of operations within CMMS.	Phase-in all Technical Section operations into CityWorks CMMS program by Oct. 1, 2004. (Chris Hendricks)	WWCD Monthly Operating Report; CityWorks technical work orders

Note: Identification number IP-2004.08 was purposely not used to maintain numbering consistency with the Departmental Incentives.

City of Eugene – Wastewater Division
Environmental Management System

2004 Objectives and Targets

Objective	Target
Reduce Consumption of Natural Resources	Improve the fuel efficiency of the Division's fleet (gasoline and diesel vehicles)
	Increase the amount of non-petroleum-based fuels by the Division's fleet
Reduce Power Consumption	Reduce annual electrical power consumption of WPCF by 5% (Baseline 2000)
	Improve the electrical efficiency of the Division's pump stations
	Reduce annual electrical power consumption of BMF (measured as kwh/dry ton biosolids produced) by 5% (Baseline 2002)
Reduce Solid Waste	Minimize quantities of non-recyclable wastes (Excluding grit truck waste and dewatering press screenings)
	Minimize recyclable wastes from solid waste disposal sent to landfill
	Reduce total solid waste (tons) by 15% based on cubic yards taken to landfill (Baseline 2002)
Improve Quality of Treated Wastewater Effluent	Reduce wastewater facility influent mercury loading by 10% (Baseline summer 2001)
Reduce use of Toxic Chemicals	Perform chemical assessment and prioritization for reduction
Reduce Air Pollution	Reduce sulfur dioxide emissions (lbs) from the engine generator by 85% (Baseline 2002)
Reduce Potable Water Use	Reduce potable water use (gallons) by 10% (Baseline 2002)

	City of Gastonia			2003 Environmental Objectives & Targets Improvement Plan Summary		
	Corresponding Requirements: **EMS Manual:** 4.3.3 and 4.3.4 **ISO Standard:** 4.3.3 Objectives and Targets and 4.3.4 Environmental Management Programs **NBP Element:** 5 **Corresponding procedures:** EMS-0100.007 & Individual improvement programs listed below	**Document No: EMS-0102.007** **Purpose**: To establish a summary of objectives and targets for prevention of pollution and for continual environmental improvement through specific programs.		Revision#: 2 Revision Date: 10/21/03	Revised By: David Shellenbarger, Asst. Div. Manager - Compliance Approved By: Larry Cummings, Division Manager WWT Signature:	Page 1 of 1
Program # & Name	**Policy / Aspect Item**	**Specific Negative Impacts**	**Objective**	**Target**	**Performance Indicator**	
EMS-2001-001 **Electrical Usage**	Pollution Prevention - More efficient use of electrical resources	drain on natural resources	Make incremental improvements in the efficient use of electrical energy.	Reduce electrical usage/gallon treated by 5% at each WWTP by 12/31/03	Quarterly review electrical costs at each plant during MRB.	
PRE-2001-001 **Oil & Grease**	Pollution Prevention	surface water quality; public relations	Develop and implement an improved oil and grease program for the City of Gastonia	Complete public education and implement fat, oil & grease program and inspect all identified restaurants by December 2004.	Quarterly review of progress with Management during the MRB.	
WWEMS-2002-001 **Biosolids Management Study**	Continual Improvement	ground water quality, legal requirements.	To perform thorough evaluation and assessment both intermediate and long term plans for the City's residuals management needs, by performing a system wide master plan study, adopting a National Biosolids Partnership EMS, and contracting professional services consultants to evaluate any remaining needs identified by first two steps.	Complete thorough evaluation and assessment of biosolids area by July 2004.	Quarterly review of progress with Management during the MRB.	
WWEMS-2002-002 **Augmented Training Program**	Continual Improvement	surface water quality; ground water quality, air quality, natural resource use, state regulations	To modify current training processes to better ensure extensive knowledge of the trainers, comprehensiveness of topics trained upon and thorough review of effectiveness of training.	Identify areas for improving training in Division and provide sufficient training in identified areas to employees by June 2006.	Quarterly review of progress with Management during the MRB.	
WWEMS-2002-004 **National Biosolids Partnership EMS**	Continual Improvement	ground water quality, legal requirements.	To successfully implement the National Biosolids Partnership program into our existing environmental management system and achieve certification for NBP EMS while maintaining ISO 14001 certification.	Receive outside certification of NBP EMS by February 2005.	Quarterly review of progress with Management during the MRB.	
WWEMS-2002-005 **Master Plan Study**	Continual Improvement	surface water quality; ground water quality, air quality, natural resource use, state regulations	To perform a broad and thorough evaluation of the wastewater collection and treatment systems and determine what overall direction should be pursued and where improvements should be made.	Complete master plan study of wastewater system by December 2003.	Quarterly review of progress with Management during the MRB.	
WWEMS-2003-003 **Disposal of Water Plant Residuals**	Polution Prevention, Improved Biosolids Quality	soil & ground water quality, state regulations	Improve the quality of biosolids generated in Gastonia's program and limit their effect on the environment through landfill disposal of water treatment plant residuals.	Arrange for dewatering and land application of water plant residuals. Begin disposal by December 31,2003	Quarterly review of progress with Management during the MRB.	

Kent County Dept. of Public Works Dover, Delaware	Title: Setting and Tracking Objectives and Targets		
	Document No.:	Date Effective:	Page:
Environmental Procedures Manual	2-04-P01	11-01-2003	1 of 6
	Prepared By:	Approved By:	Revisions No.:
Objectives and Targets	Jim Newton		0

CONTENTS

1.0   PURPOSE

1.1   The purpose of this procedure is to establish the general requirements for the work process of setting and tracking EMS objectives and targets based upon significant environmental aspects that are applicable to the Kent County Dept. of Public Works Regional Wastewater Treatment Facility.

1.2   The purpose of this work process is to establish the Kent County Dept. of Public Works specification for setting and tracking EMS objectives and targets that apply to the facility to facilitate compliance with the applicable requirements.

2.0   SCOPE

2.1   This procedure addresses the setting and tracking of EMS objectives and targets applicable to the Kent County Dept. of Public Works Environmental Program.

3.0   DEFINITIONS

3.1   *Activity* – Something that occurs at the wastewater facility in order to transport wastewater, produce clean wastewater or produce quality biosolids (Kentorganite).

3.2   Baseline – The starting point from which the meeting of an objective is to be measured, such as the number of kilowatt hours of electricity used to run the basin blowers for 2002.

3.3   *Objective* – An overall goal, arising from the environmental policy and the list of significant environmental aspects and critical control points, that an organization sets itself to achieve. An example would be to reduce energy consumption across the facility.

3.4   *Target* – a measurable performance requirement that arises from an objective. An example would be to reduce energy consumed by the biosolids dryers by 10% by January 2005.

Kent County Dept. of Public Works **Dover, Delaware**	Title: Setting and Tracking Objectives and Targets		
	Document No.:	Date Effective:	Page:
Environmental Procedures Manual	**2-04-P01**	**11-01-2003**	**2 of 6**
	Prepared By:	Approved By:	Revisions No.:
Objectives and Targets	**Jim Newton**		**0**

4.0   REFERENCES

4.1   Kent County Dept. of Public Works Environmental Management System Program Manual

5.0   REQUIREMENTS

5.1   *Identifying Objectives*

5.1.1.   The Core Team will evaluate the list of significant environmental aspects and critical control points generated under Environmental Management System Procedure 2-04-P01 for areas of commonality.

5.1.2   A list of objectives will be prepared by the Environmental Management System Representative to address the general common significant environmental aspects and critical control points, and compared to the environmental/biosolids policy.   The objectives would be agreed to by the Core Team and posted on the Public Works website.

5.2   *Identifying Targets*

5.2.1   The Core Team will evaluate the selected objectives and determine the tasks required to meet each objective. The Core Team will assign target dates and responsible parties to ensure that the dates are met. The Core Team will communicate the selected objectives and targets with senior management to ensure that adequate resources and support is available to accomplish the required elements.

5.2.2   A table will be prepared for each objective with all target activities, dates and responsible parties listed. This table will be posted on the Public Works website and maintained by the Environmental Management System representative.

5.3   *Tracking Objectives and Targets*

5.3.1   The Core Team will evaluate each objective and compare key objective and target actual accomplishments with the planned program on a quarterly basis.

5.3.2   The Core Team will revise the objectives and targets, as necessary, to ensure that movement is continuing to be made towards completion.

5.3.3   Management will review the objectives and targets annually, and recommend changes based upon their review.

6.0   RESPONSIBILITIES

6.1   The EMS Core Team shall develop the objective and targets based upon the significant environmental aspects and critical control points developed under Environmental Management System Procedure 2-04-P01.

6.2   The Core Team shall prepare a list of target activities and determine appropriate baseline information in order to meet selected objectives.

6.3   The Environmental Management System Representative shall maintain and post the list of objectives and target activities, dates and responsible persons.

6.4   The Core Team shall conduct a quarterly progress evaluation and make modifications as necessary to selected objectives and targets.

6.5   Senior management shall conduct an annual review of selected objectives and targets, and provide necessary resources to ensure that they are met.

7.0   DOCUMENTS

7.1   *Related Documents*

None

7.2   *Document Control*

This procedure shall be controlled in accordance with the Environmental Management System Procedures 2-12-P01, Controlling Documents. Maintaining this Procedure is the responsibility of the *Environmental Program Manager* to facilitate retrievability of the documents and up-to-date information.

8.0   RECORDS

8.1   *Required Records*

The list of activities; the list of aspects, and the priority list of aspects shall all be maintained as appendices to this procedure.

8.2   *Records Control*

All records, if required, pertaining to this procedure shall be controlled in accordance with the Environmental Management System Procedures 2-11-P02, Controlling Records.

9.0   ATTACHMENTS

There are no attachments to this procedure.

10.0   APPENDICES

10.1   Appendix A – List of selected objectives and targets currently being addressed by the EMS.

11.0   REVISION HISTORY

Revision No.	Effective Date	Responsible Person	Description of Revision	Appv. By
0		Jim Newton	Initial Issue	

Appendix A

List of selected objectives and targets currently being addressed by the EMS.

2003-2004 Objectives and Targets Table

Objective	Target	Significant Aspects and CCPs Addressed	Environmental Management Program	Proposed Date	Date Completed
Reduce air pollution					
	Reduce sulfur, particulate and CO emissions by 50% from CY 2002 levels	1,2,3,6,8		June 30, 2005	
			Replace 75% of diesel usage with biodiesel in operating equipment	June 30, 2005	
			Replace emergency generator diesel fuel with biodiesel	June 1, 2004	
			Get DNREC to agree to use alternative electricity operation	December 1, 2004	
			Replace dryer diesel fuel with bio-fuel made from grease trap waste or biodiesel	June 1, 2006	
Reduce energy consumption		1,2,3,6			
	Reduce electricity usage by 20% from CY 2002 levels			December 31, 2005	
			Enroll in EPA Green Lights program	June 30, 2004	
			Get DNREC to agree to use alternative electricity operation	December 31, 2004	
			Upgrade to more energy efficient pumps, lights, etc.	December 31, 2005	
			Seek renewable energy alternatives such as wind	December 31, 2006	
Reduce or eliminate effects of chlorine and sulfur dioxide		7			
	Improve safety of existing processes or switch to an alternative disinfection method			June 30, 2009	
			Evaluate chlorine hazard potential	September 30, 2004	
			Hire consultant to look at cost effective alternatives	December 31, 2004	
			Develop plans for alternatives or ways to improve safety of current systems	June 30, 2006	
			Budget finances	November 30, 2006	
			Secure financing	July 1, 2007	
			Construct	December 31, 2008	
			Operate	June 30, 2009	
Reducing sanitary sewer overflows (a.k.a. spills)		2,4,5,8			
	Reduce SSOs by 40% form CY 2002 levels			June 30, 2005	
			Develop system to document sources of SSOs	June 30, 2004	
			Implement FOG program	December 31, 2004	
			Develop action plans to reduce or eliminates SSOs	December 31, 2004	
			Develop CMOM program	June 30, 2005	

MSD – Buncombe County
EMS Environmental 2004 Objectives & Targets

Objective	Target	Baseline	Target	Objective Owner	Legal/ Other Requirements	Significant Aspect	Technological Options	Financial, & Operational	Business Goals	Interested Parties
Sludge Handling Improvements	Install new belt filter presses, new refractory and heat exchanger by August 2004	NA	NA	John Kiviniemi	✗	✔	✔	✔	✔	✗
Research Lagoon material placement alternatives.	Restore lagoon to originally intended use and ash disposal only by December 2005	NA	NA	John Kiviniemi	✔	✔	✔	✔	✔	✔
Septage Receiving Station	Construct by December 2004	N/A	N/A	John Kiviniemi	✔	✗	✔	✔	✔	✔
Vulnerability Assessment	Complete Assessment Review by July 2004	N/A	N/A	John Kiviniemi	✔	✗	✗	✔	✔	✔

SAMPLE EMS DOCUMENTATION

ENVIRONMENTAL MANAGEMENT PROGRAMS

Charleston CPW – WWCD Improvement Plan
Charleston CPW – System Cleaning Program

Environmental Management System
Summary of Objectives and Targets

Prepared by: WWCD EMS Progress Team / Senior Supervisors   **Approved by/Date:** A. Williams / **Feb. 9, 2004**

Purpose/Scope: To identify and communicate environmental objectives and targets based upon consideration of CPW's analysis of operational requirements, significant environmental impacts, regulatory standards and compliance, technological options, financial resources, the views of interested parties and the strategic business plan.

Instructions: Each CPW department and/or group having been identified by the P2 Team, as having significant environmental impacts (and/or impacts which management requires departments to track), shall complete this form. This form is to be updated annually (and retained as a departmental record) and updated thereafter when modifications and/or changes occur in CPW activities, products, and/or services. Results of the activities listed below are to be reported as they occur in the departments Monthly Operating Report (MOR). **Note:** This form may be replicated on a computer or duplicated on a photocopier. The computer copy must look similar to this document and contain the same information.

Aspect Item	Specific Negative Impact *(Enter a brief description.)*	Objective & Target ID/No.	Objective	Target/Performance Indicator	Performance Record
Sewer System Overflows (Significant Aspect)	Contamination of environment	IP-2004.01 (System Cleaning Program)	Reduce the number of sewer system overflows by systematically cleaning designated mainlines.	Clean 556,200′ (46,350′ monthly ave.) of wastewater collection mainlines on problem and high-risk areas through the 2004-CY. (Ronald Inabinet)	WWCD Monthly Operating Report; Work Orders
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.02 (Closed-circuit Television Inspection Program)	Acquire system condition and critical data for proper asset management.	Perform CCTV inspections on 288,000′ (24,000′ monthly ave.) on the collection system through the 2004-CY. (Franklin Yates)	WWCD Monthly Operating Report; Inspection reports
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.03 (Mainline Rehab Program)	Rehabilitate existing mainlines to prolong their life and increase efficiency.	Rehab 8000' of wastewater collection mainlines by October 31, 2004. (Franklin Yates)	WWCD Monthly Operating Report
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.04 (Lateral Lining Process)	Rehabilitate laterals utilizing the Cured in Place Process (CIPP).	Rehabilitate 65 laterals using the CIPP process. Complete by Oct. 31, 2004. (Tony Coker)	WWCD Monthly Operating Report; Work orders
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.05 (Infrastructure Repair Program)	Repair defects in the collection system possibly contributing to inflow & infiltration (I & I).	Perform 540 (45 ave. per month) various point and service repairs for 2004-CY. (Tony Coker)	WWCD Monthly Operating Report; Work orders

DOCUMENT DISTRIBUTION
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Objectives and Targets - Continuation Sheet

This sheet may be used as an attachment to the EMS Objectives and Targets form when additional space is required.
NOTE: This form may be replicated on a computer or duplicated on a photocopier. The computer copy must look similar to this document and contain the same information.

Aspect Item	Specific Negative Impact *(Enter a brief description.)*	Objective & Target ID/No.	Objective	Target/Performance Indicator	Performance Record
Preventive Maintenance	Potential problems with equipment operation resulting in backups and SSOs	IP-2004.06 (Valve Exercising Program)	Ensure all critical valves are in good operation should an emergency occur.	Develop a valve-exercising program. Include drawings delineating valves to operate, SOI(s) & schedule(s). Establish program by May 1, 2004. (Harry McGee)	WWCD Monthly Operating Report; Associated drawings (GIS); Standard Operating Instruction(s); CityWorks scheduling via work orders
Exfiltration	Contamination of waterways	IP-2004.07 (Water Quality Assurance Program)	Identify leaks in collection system resulting in the potential contamination of waterways.	Identify locations where wastewater mains cross waterways and create a GIS map of those locations. Complete by May 1, 2004. Develop an inspection schedule and create work orders in the CMMS by October 31, 2004. (Gregory Daniels)	WWCD Monthly Operating Report; Standard Operating Instruction(s); Work Orders
Emergency Preparedness/ Response	Increased potential for damage to infrastructure, equipment and environment	IP-2004.09 (Flow Control Program)	Develop procedures for redirecting flows during emergency situations.	Develop a flow control program involving valves associated with force mains. Include drawings delineating valves to operate during specified emergencies. Finalize by July 1, 2004. (Harry McGee)	WWCD Monthly Operating Report; Associated drawings (GIS); Standard Operating Instruction(s)
Computerized Maintenance Management System (CMMS)	Potential for maintenance activities to be incomplete; loss of permanent records	IP-2004.10 (Asset Management and Evaluation Program)	Develop a system for evaluating the infrastructure for prioritizing rehabilitation initiatives.	Develop an asset management/evaluation program to include the production of reports identifying system rehabilitation priorities. Accomplish by July 1, 2004. (Chris Hendricks)	WWCD Monthly Operating Report; Standard Operating Instruction(s); Associated standard reports
Training	Lack of intellectual capitol with regard to environmental and	IP-2004.11 (Skills-based Training	Establish improved controls regarding training	Establish procedures & reports for managing the SBT Training database. Accomplish by July 1,	WWCD Monthly Operating Report; Standard Operating

Objectives and Targets - Continuation Sheet

This sheet may be used as an attachment to the EMS Objectives and Targets form when additional space is required.
NOTE: This form may be replicated on a computer or duplicated on a photocopier. The computer copy must look similar to this document and contain the same information.

Aspect Item	Specific Negative Impact (Enter a brief description.)	Objective & Target ID/No.	Objective	Target/Performance Indicator	Performance Record
	operational effectiveness	Improvement Program)	management.	2004. (Susan Roberts)	Instruction(s); Standard training management reports
Operational Evaluations	Improper evaluations resulting in unqualified rehabilitation planning	IP-2004.12 (Pump Station Operational Evaluation Program)	Develop methodologies & criteria for establishing pump station rehabilitation priorities.	Develop formal, logical criteria for determining schedules for pump station rehabilitation. Complete by Aug. 1, 2004. (Harry McGee)	WWCD Monthly Operating Report; Grading Criteria Worksheet; Schedules (if needed)
Air Release Valve PM	Loss of operational & design effectiveness of force mains & pump stations; exfiltration	IP-2004.13 (Air Release Valve PM Program)	Ensure air release valves are working properly.	Establish an air release valve inspection and maintenance program. Complete by Aug. 1, 2004. (Ronald Inabinet)	WWCD Monthly Operating Report; Standard Operating Instruction(s); Inspection and PM schedule
Inflow & Infiltration (I & I) (Significant Aspect)	Loss of natural resources through energy use	IP-2004.14 (I & I Reduction Plan)	Establish a standard methodology for mitigating I & I	Develop a manual and/or SOI(s) for I & I reductions. Include a structured, comprehensive approach to I&I reduction within the document(s), and complete by Sept. 1, 2004. (Franklin Yates)	WWCD Monthly Operating Report; Standard Operating Instruction(s); I & I Manual (if necessary)
Computerized Maintenance Management System (CMMS)	Potential for maintenance activities to be incomplete; loss of permanent records	IP-2004.15 (CMMS Phase-in Project)	Encompass all aspects of operations within CMMS.	Phase-in all Technical Section operations into CityWorks CMMS program by Oct. 1, 2004. (Chris Hendricks)	WWCD Monthly Operating Report; CityWorks technical work orders

Note: Identification number IP-2004.08 was purposely not used to maintain numbering consistency with the Departmental Incentives.

Form No.: P2-4.3.3-001A (2/4/2003)
Page 1 of 1

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Wastewater Collection Department
Environmental Management Systems
Improvement Program

CPW EMS ID No: EMS - 4.3.3 Objectives & Targets ISO 14001, Sub Clause 4.3.3 Objectives & Targets	Revision Date: Feb. 6, 2004	Prepared By: Approved By: Signature:	Ronnie Inabinet A. Williams, Superintendent On File

Program Name: System Cleaning Program	*Pgm. No. (Obj. & Target ID): IP-2004.01* *Section: Maintenance*

1. Background / Purpose:

System cleaning is essential to the proper maintenance and operation of the wastewater collection system. Without scheduled maintenance of the collection system sediment, debris, grease, roots, solids and deposits build up and accumulate in the system. An emphasis is placed on areas that historically have experienced blockages within the system.

2. Objective / Scope:

Objective:

The objective of the WWCD System Cleaning Program is to reduce the number of Sewer System Overflows (SSO's) experienced by systematically cleaning designated mainlines.

Scope:

Cleaning is accomplished through the use of Boss and Harben cleaning units and Vac Trucks. This equipment utilizes pressures of up to 4000 PSI to scour the pipewalls within the collection system. Various specialized nozzles are utilized during this cleaning process. These nozzles are specifically designed to accomplish certain types of cleaning, providing the most effective means to achieve the desired results.

3. Target / Timelines:

Clean 556,200 feet (monthly ave. of 46,350) of wastewater collection mainlines on problem and high-risk areas through the 2004-CY.

See associated Objective & Target Action Plan for action items, responsibilities and schedules.

4. Performance Indicator:

WWCD Monthly Operating Report
Work Orders

5. Resource Allocation:

For funds allocation, see the 2004 Wastewater Collection Department Operations & Maintenance Budget, Responsibility Number 013, Cost Center (Group Number) 3400 - Operation and Maintenance Budget.

6. Related Documents:

2004 EMS Summary of Objectives & Targets
WWCD Monthly Operating Report
Work orders

P(Hobson1):/Dept. Work/ Wastwater Shared./ISO/Objectives & Targets/2004 Objectives & Targets/2004-01 System Cleaning Prgm.doc

SAMPLE EMS DOCUMENTATION

TRAINING

Charleston CPW – Training, Awareness and Competence Procedure
City of Gastonia WWTP – Training Procedure

CPW ENVIRONMENTAL MANAGEMENT SYSTEM PROCEDURE

The on-line version and secured hardcopy are the controlled documents. The secured hardcopy will be identified by an "Official Document" stamp giving date of distribution. Any and all other documents are uncontrolled. Contact the EMS Program Manager for revision level status.

Effective Date:	**October 1, 2000**	**Page 1 of 3**
Revision: 2	**Identification Number: EMS – 4. 4. 2**	
Title:	**Training, Awareness and Competence Procedure**	
Prepared By:	**EMS Procedures Subcommittee**	
Reviewed By:	**EMS Management Steering Committee**	
Approved By:	**William E. Koopman Jr., General Manager**	
	John Cook PE, Assistant General Manager	
Date Approved;	**August 25, 2000**	

0.0 Requirement: ISO 14001, Sub Clause 4.4.2 Training

1.0 Purpose

To identify, provide and track training that will help associates to minimize environmental impacts and increases operating efficiencies.

Scope

ISO 14001, sub clause 4.4.2, requires CPW to identify training needs and provide specific training to those associates whose work activities could cause adverse environmental impact.

3.0 Responsibility & Authority

    3.1 Each department head shall identify environmental training needs.

    3.2 The department head is responsible for maintaining environmental training requirements.

    3.3 Environmental training needs will be evaluated annually by the department.

4.0 Procedure

    4.1 Identification of Training Needs

The knowledge and skills of associates necessary for the department to achieve environmental objectives will need to be identified. Knowledge and skill levels should be considered in recruitment and personnel selection. Ongoing development of associate skills will occur through internal and external training and education programs.

4.2 Conduct of Environmental Training
Training appropriate to the achievement of environmental policies, objectives and targets will be provided to all personnel within the department. Associates should have an appropriate knowledge base, which includes training in the methods and skills required to perform their tasks in an efficient and competent fashion and knowledge of the impact their activities can have on the environment if performed incorrectly.

4.3 Legal and Other Requirements
Education and training will be performed in each department to ensure that associates have appropriate and current knowledge of regulatory requirements, environmental policy and the department's procedures and objectives. The level and detail of training will be determined according to the work assignment or task.

4.4 Training Elements
Departmental environmental training programs should have the following elements:
• Identification of associate training needs to accomplish job assignment;
• Development of a training plan to address defined needs;
• Training of target associate groups;
• Documentation of training received;
• Evaluation of training received.

NOTE: Examples of types of Environmental Training:

Environmental Policy All associates would be required to receive this training to gain an understanding and commitment to the environmental policy, objectives, and targets of CPW.

<u>Strategic Environmental Management</u>   Senior management may receive this training to gain commitment and alignment of CPW's environmental policy.

<u>Skills Enhancement</u> Associates with environmental responsibilities linked to significant aspects shall be required to receive identified training to improve performance in specific areas of the department (e.g. operations, laboratory, engineering, maintenance, etc).

<u>Regulatory Compliance</u>   Associates whose actions can affect environmental compliance shall be required to receive training on the appropriate regulatory and internal work instruction requirements and be made aware on the consequences of regulatory non-compliance or deviation from approved work instructions.

4.5 Adequate Resources
Adequate resources are to be made available to provide the identified training. In certain cases, training may require certified trainers, such as CDL, HAZWOPER or CPR. Environmental training will also be provided within six months of an associate's hire date. Annual refresher training will be conducted on CPW policy, and departmental objectives and targets.

4.6 Tracking the Training Hours
To document compliance with regulatory and policy requirements, training hours will be collected and tracked. The department head will compare training received with the training plan to ensure policy goals are met. Training records should include:

- Associate name,
- Job title,
- Job description,
- Training requirements,
- Total training hours by category

5.0   Related Documents and Data

5.1   Environmental Training Records
5.2   Instructor Certification Records
5.3   CPW Training Record Form

Standard Operating Procedure – EMS-0100.005 Name: Training Procedure	**Corresponding Requirements:** ISO Standard: 4.4.2 EMS Manual: 4.4.2 NBP Element: 8
Prepared By: Beth Eckert, Environmental / Administrative Manager	Revision Date: 3/3/03 Revision #: 6
Approved By: Beth Eckert, Environmental / Administrative Manager Signature:	Effective Date: 11/4/99 Page 1 of 5

1.0 Purpose

1.1 The City of Gastonia Wastewater Treatment Division (WWTD) began implementing an ISO 14001 Environmental Management System (EMS) in January , 2000 and a National Biosolids Partnership EMS in July 2002. As a part of this process, the Division has identified and established documented procedures for the control and monitoring and measuring of the EMS, the significant aspects and impacts and critical control points determined by the Division, and the identified legal and other requirements, when necessary. Due to the nature of the WWT business, processes involved in the control and monitoring and measuring of most significant aspects and meeting legal and other requirements have been practiced for many years throughout the WWT facilities. Also, most staff employed by the Division have been adequately performing these tasks in the absence of documented procedures.

1.2 Management and most operations and laboratory staff have received certifications in water treatment, wastewater treatment, pretreatment, and/or laboratory work. Training at the WWT facilities has historically been done via on the job training by existing employees and supervisors. This process will not be deleted, rather, it will be supplemented by the existence of documented procedures for reference.

1.3 Once they have been formalized, documented training will be done for each employee on procedures relevant to their job duties. However, tasks required to be done in the course of treating or monitoring the wastewater will be performed as needed even in the absence of documented procedures and/or documented training.

1.4 This procedure is to establish a guide for the training of current and future personnel on the EMS and related documents and procedures.

2.0 Associated Equipment

2.1 None

3.0 Associated Documents

3.1 *Document Control Matrix for EMS System - EMS-0101.000A*

3.2 *Document Control Matrix for Crowders Operations - WCR-0101.000A*

3.3 *Document Control Matrix for Crowders Laboratory - WCR-0101.100A*

3.4 *Document Control Matrix for Long Creek Operations - WLC-0101.000A*

3.5 *Document Control Matrix for Long Creek Laboratory - WLC-0101.100A*

3.6 *Document Control Matrix for Pretreatment - WPR-0101.000A*

3.7 *Document Control Matrix for Biosolids - WRF-0101.000A*

3.8 *Aspect and Impact Ranking Form – EMS-0101.003E*

3.9 *Procedure Training Sign-In Sheet –EMS-0101.005A*

3.10 *Training Matrix – EMS-0102.005B*

3.11 *National Biosolids Partnership EMS Guidance Manual*

3.12 *National Biosolids Partnership Manual of Good Practice*

4.0 Procedure

4.1 All employees will be trained on the EMS policy and to a general EMS awareness level. All contractors will be notified of the environmental policy via mail and/or notification upon arrival at the site. Signs referencing the EMS policy have been posted at the entrance to the WWT facilities and the Resource Recovery Farm and policies are in the entrance areas or conference room of each Division location for review by visitors.

4.2 Personnel that can have a significant impact on the environment through their work practices will be trained on:

   4.2.1 The importance of conformance to the environmental policy, requirements of the environmental management system, and emergency preparedness and response requirements. Roles and responsibilities related to these will be communicated.

   4.2.2 The potential or actual significant environmental impacts of their work activities.

   4.2.3 The relevant procedures identified in the training matrix, the benefits of adhering to the procedures and potential environmental consequences of departure from them.

4.3 Training requirements of contractor personnel will be established on a case by case basis. City Staff who serves as the Contractors Contact person shall establish and track these requirements.

4.4 Training roles of Division personnel are as follows:

   4.4.1 EMS Coordinator and management will identify training needs (Training Matrix EMS-0101.005B) regarding the EMS procedures and the EMS Coordinator, or designee,

will train area Supervisors and management on relevant procedures. The EMS Coordinator shall assist supervisors upon request with the training of other personnel.

4.4.2 Supervisors are responsible for identifying training needs of their respective personnel on area Standard Operating Instructions (SOIs). Supervisors are also responsible for ensuring that the identified training needs of their personnel on EMS procedures and area SOIs are met.

4.4.3 Persons either preparing a procedure or approving a procedure are not required to receive documented training on the procedure. Either of these persons must train Division staff that has been identified as needing the training. This may involve the training of Supervisors or other Division personnel so that they may appropriately train identified Division staff.

4.5 Standard Operating Instructions must be developed for each activity which has an impact on a significant environmental aspect or that is needed to properly control a critical control point (as identified on the Aspect and Impact and Critical Control Point Ranking Form # EMS-0101.003E). The area supervisors are responsible for using their knowledge of the operation of their area to determine which procedures affect the significant environmental aspects.

4.5.1 Additionally, supervisors are to refer to the list of critical control points and the NBP Manual of Good Practice for additional information pertaining to procedure requirements to address activities at control critical control points.

4.6 All employees must receive training on documented procedures and revisions which are not exempted via the Corrective/Preventative Action procedure (EMS-0100.004). The area supervisors are responsible for determining which procedures are required for each employee.

4.7 Training needs will be indicated on the training matrix form (EMS-0102.005B) by gray shading. The EMS coordinator or other personnel authorized to make changes on the read-only drive must be notified of any changes in the employee training requirements.

4.8 The EMS Coordinator or designated personnel will train all new employees on policy and EMS awareness on their first day of work, whenever possible, and all current EMS procedures appropriate for the position within 30 days of reporting to work.

4.8.1 Supervisors must make arrangements with the EMS Coordinator to ensure training is completed as required when a new employee reports to work with the Division.

4.9 Training will not be required on revised procedures where the intent of the procedure is not revised, merely logistics i.e. spelling, grammar, numbering, etc... This occurrence will be tracked by a C/PAR.

4.10 When deemed appropriate by the Supervisor, retraining may be done only on the modified portion of a revised procedure. When training is done this way the revised section must be noted on the training form.

4.11 Retraining will be done as a result of an incident where a procedure was not properly followed.

4.12 All trained personnel must sign the sign-in sheet (*EMS-0101.005A*) to document their training and understanding of the procedure.

4.13 The effectiveness of the training will be evaluated by an oral or written test, and/or by observation of the employee performing the task according to procedure. The supervisor or person designated to perform the training will use this information to evaluate whether the training is sufficient or if more training is required. When the training is judged to be sufficient, the supervisor/trainer will date and initial the "Training Sufficient" section of the training sign-in-sheet (EMS-0101.005A) and the employee will be permitted to perform the task unsupervised.

4.13.1 In the event that training is done over a period of time and not on one day, the training may be documented by the entry of a range of dates on the training form and matrix.

4.13.2 Many employees may only be required to perform various portions of a procedure. Training may only be performed on the portion of the procedure that is appropriate and the sections of the procedure trained on must be indicated on the training form (EMS-101.005A).

4.14 The sign-in sheet must be submitted to the EMS Coordinator, or designee, for recording on the Training Matrix (EMS-0101.005B).

4.15 All internal EMS auditors must have either received training from an outside EMS auditing training course or have observed at least one internal audit, audited under the guidance of a previously qualified auditor, and have been trained on the City's EMS Auditing procedure. Prior to auditing without guidance, new auditors must have been deemed sufficiently trained

and able to perform audits by the EMS Coordinator. Internal training and determination must be documented on a procedure training sign-in form (EMS-0101.005A).

4.15.1 Documentation verifying external auditor training will be maintained in EMS files.

4.16 Compliance auditors are chosen by the Division Manager based on knowledge and experience. The Division staff who are currently serving as compliance auditors have prepared the auditing procedures based on their knowledge and experience. Future internal compliance auditors must receive documented training on the auditing procedure and observe at least one audit prior to becoming a compliance auditor.

5.0 Revision History:

| Revision | | C/PAR # | Reason for Revision | Description of Revision |
Date	#			
3/3/03	6	EMS-0084	C/PAR	Added a modification history section
	6	EMS-0116	C/PAR	Added NBP requirements as a part of the WWTD's participation in the NBP demonstration group.

SAMPLE EMS DOCUMENTATION

INTERNAL AND EXTERNAL COMMUNICATION

Charleston CPW – Internal Communication Procedure
Charleston CPW – External Communication Procedure
City of San Diego WWC – Communication and Environmental Information

CPW ENVIRONMENTAL MANAGEMENT SYSTEM PROCEDURE

The on-line version and secured hardcopy are the controlled documents. The secured hardcopy will be identified by an "Official Document" stamp giving date of distribution. Any and all other documents are uncontrolled. Contact the EMS Program Manager for revision level status.

Effective Date: October 1, 2000   Page 1 of 3
Revision: 2   **Identification Number: EMS – 4. 4. 3 (A)**
Title: **Internal Communication Procedure**

Prepared By: **EMS Procedures Subcommittee**
Reviewed By: **EMS Management Steering Committee**

Approved By: **William E. Koopman Jr., General Manager**
          John Cook PE, Assistant General Manager
Date Approved: **August 25, 2000**

0.0 Requirement: ISO 14001, Sub Clause 4.4.3 Communication

1.0 Purpose

To build understanding, cooperation, and involvement from all associates in the performance of their duties in an environmentally conscious manner.

2.0 Scope

ISO 14001, sub clause 4.4.3, with regard to environmental objectives and targets, requires establishing processes to report internally and, where desired externally, on the environmental activities of the organization.

3.0 Responsibility & Authority

    3.1 Communication of environmental issues is the responsibility of all CPW departments.

    3.2 It is the responsibility of every associate to communicate environmental concerns, problems, or suggestions to their supervisor.

4.0 Procedure

4.1 Communication through Normal Management Channels

4.1.1 Management Channels
The traditional flow of information from one management level to the next is appropriate and will be used to communicate environmental information. Periodic, or routine staff meetings with open dialogue is encouraged.

4.1.2 Communication through Internal Newsletters
Certain environmental communications will be made through internal newsletters. Programs that promote environmental excellence should be communicated to CPW associates and considered for release to the public.

4.1.3 Communication through Videos
Videos may be used to relay environmental information to large groups of associates.

4.1.4 Communication through e-mail and Special Memos
Announcements concerning environmental improvement programs, upcoming internal audits, DHEC inspections, etc. will be disseminated through e-mail for large groups of associates or by special memo to specific individuals or groups.

4.1.5 Communication through Suggestion Boxes
Suggestion boxes will be made readily available to all associates. Communication in this form coming directly from individual associates is a valuable source of information about potential environmental impacts. Suggestions will be evaluated concerning environmental improvements. Rewards will be considered for suggestions that are implemented.

4.1.6 Special Communication via Attorney

Certain environmental information should be relayed only to those with a need to know by an attorney. When communication is done in this way the information is protected by the Attorney-Client privilege doctrine.

4.1.7   Recognition Communication
Both positive and negative recognition must be given to associates. Positive recognition shall be given in accordance with CPW recognition programs. Negative recognition must be given if employees knowingly violate regulations or CPW policies that adversely impact the environment. Disciplinary action will be administered in accordance with CPW policy.

4.2 Related Documents and Data

4.2.1   Records containing internal communication sent to associates.
4.2.2   Records containing associate feedback.

CPW ENVIRONMENTAL MANAGEMENT SYSTEM PROCEDURE

The on-line version and secured hardcopy are the controlled documents. The secured hardcopy will be identified by an "Official Document" stamp giving date of distribution. Any and all other documents are uncontrolled. Contact EMS Program Manager for revision level status.

Effective Date:	**October 1, 2000**	**Page 1 of 3**
Revision: 2	**Identification Number: EMS – 4. 4. 3 (B)**	
Title:	**External Communication Procedure**	
Prepared By:	**EMS Procedures Subcommittee**	
Reviewed By:	**EMS Management Steering Committee**	
Approved By:	**William E. Koopman Jr., General Manager**	
	John Cook PE, Assistant general Manager	
Date Approved:	**August 25, 2000**	

0.0 Requirement: ISO 14001, Sub Clause 4.4.3 Communication

1.0 Purpose

The purpose of this procedure is to define the steps that CPW follows to:

(1) Control the receipt, documentation and response to external communications regarding CPW's environmental aspects
(2) Consider external communication procedure on significant environmental aspects
(3) Document related decisions

2.0 Scope

ISO 14001, sub clause 4.4.3, with regard to external communication requires establishing processes on receiving, documenting and responding to communications from external interested parties.

3.0 Responsibility & Authority

    3.1 The department head (or designee) investigates the need for external communication.

    3.2 The Customer Relations Specialist prepares releases of public interest.

    3.3 The General Manager (or designee) authorizes prepared releases to the public.

4.0 Procedure

4.1 External Communication Channels

4.1.1 With regard to CPW's environmental aspects or environmental management system (EMS) the department head (or designee) investigates the need for external communication on a case by case basis. The investigation can be initiated by, but is not limited to, the following:

- Complaints and/or inquires from customers, SCDHEC, community groups, or other interested parties
- External promotional activities regarding CPW environmental policy or programs
- New or changing environmental regulations

NOTE 1: Such communications include, but are not limited to:

- Statements regarding CPW's policy commitment to the environment
- Statements regarding CPW's significant environmental aspects and their potential impacts
- External interested party concerns and questions, and responses to these concerns and questions
- Reports on performance with regard to environmental quality, objectives and targets, and on compliance with environmental regulations as determined by audits and management reviews
- Communications initiated by or to be received by potential legal entities

4.1.2 The department head or (designee) identifies the extent and/or impact of the problem or inquiry and determines what information needs to be communicated.

4.1.3 The department head or (designee) obtains the needed information from the appropriate associates within CPW or the department and, as necessary assistance from the Customer Relations Specialist,

who constructs the content, format, and method of the `communication accordingly. Designated individuals are then authorized to release information to external parties.

4.1.4   Statements regarding CPW environmental policy, significant environmental aspects and their potential impacts, reports on environmental performance or compliance with regulatory requirements and communications to legal entities, shall be reviewed and approved by the CPW General Manager (or designee) prior to release.

NOTE 2:   Information in the communication should be understandable, adequately explained, verifiable, and presented in a consistent form. Methods to be considered include, but are not limited to:

- External newspapers or newsletters
- Public announcements and/or news conferences (TV, radio, etc.)
- Paid advertisements or public notices in newspapers, industry journals, or other publications
- Annual reports
- Regulatory submissions and public records
- Commission meetings
- Letters, memos and other correspondence
- Electronic mail messages; faxes, etc.
- Bill inserts
- Internet Web Site

4.1.5   Executive management (or designee) issues the communication to the required recipients and interested parties.

4.1.6   A copy of communication received or sent, as well as any requests that initiated the communication and/or requests for the information shall be retained for a period of **5** years.

4.2 Related Documents and Data

4.2.1   Records regarding EMS external communications.

DD-SEOP-4.4.3

COMMUNICATION OF ENVIRONMENTAL INFORMATION

(INTERNAL AND EXTERNAL)

1.0   PURPOSE AND SCOPE

This procedure describes the methods to be used for documenting and responding to inquiries related to the environmental policies, practices, and performance of the City of San Diego's Metropolitan Wastewater Department (MWWD) Wastewater Collections (WWC) Division. This procedure applies to inquiries made by interested parties external to the WWC Division, as well as WWC Division employees, contractors, or suppliers. The procedure does not apply to the resolution of questions that may be raised during routine environmental training activities, internal, and external audits.

2.0   DEFINITIONS

2.1   Interested Party

For the purposes of this procedure, an interested party is defined as an individual, organization, or group interested in, concerned with, or affected by the environmental performance of the WWC Division. Examples of interested parties include regulatory agencies or authorities, community groups, environmental organizations, the press, private citizens, employees, and employee organizations; the definition may also be extended to contractors or suppliers working at or delivering materials or services to individual WWC Division sections.

2.2 Computerized Maintenance Management System

Any Computerized system that functions as a tool for dispatching and documenting WWC Division field personnel to sewer related emergencies.

3.0   RESPONSIBILITIES

3.1   Environmental Management Representative

The Environmental Management Representative (EMR) has primary responsibility for coordinating, receiving, logging, and evaluating all inquiries about WWC Division's environmental policies, practices, and performance with appropriate WWC Section Managers, staff and the MWWD Public Information Section. The EMR is responsible for responding directly to inquiries related to the ISO 14001 Environmental Management System (EMS). made by WWC Division personnel, but shall review all external EMS inquiries with the responsible Section Manger, Deputy Director and/or Public Information Section prior to making a response.

3.2   WWC Division Personnel

Any WWC Division employee who is contacted by an interested party requesting information regarding the Division's environmental policies, practices, or performance shall refer all such

inquiries to the appropriate supervisor or Section Manager, who in turn will answer or direct the inquiry to the EMR (or Deputy Director as needed) for evaluation and appropriate action.

3.3 Deputy Director, WWC Division

The WWC Deputy Director is responsible for evaluating external information requests with the EMR, for providing direction as to whether a written or verbal response is required, and for reviewing and approving all written responses.

3.4 Section Manager

The Section Manager is responsible for responding to, and logging any inquiries concerning section specific performance and/or programs. The Section Manager may direct inquiry to appropriate Section staff and /or EMR.

4.0 PROCEDURE

General

Internal communication may be conducted through any of the following manners:
- normal management channels i.e. meetings where information flows from one management level to the next)
- electronic message and e-mail
- memos, posters and circulars on notice boards
- internal newsletter
- training programs

External communication issues will be conducted through the following means:

Sewer Pump Stations Section, Construction/TV Section, Main Cleaning Maintenance Section, Engineering Section, Maintenance Coordination/Scheduling Section, Administration Section:

- Sewer Response Inquiry: All inquires of this nature need to be referred to the Sewer Emergency Hotline at (619) 515-3525 and documented in the current CMMS per the WWC Division Sewer Overflow Response and Tracking Plan.

Food Establishment Waste Discharge Section:

- Sewer Infrastructure Inquiry: All FEWD inquiries of this nature will be documented and tracked in the FEWD CMMS.

All Sections:

- Environmental Policy Inquiry: Document the inquiry in the current CMMS and refer the inquiry to EMR

The procedure consists of the following steps:

4.1   The EMR shall document the receipt of written or verbal inquiries related to WWC Division's environmental policies and performance on an Environmental Communications Log form (DD-F-001.0, see the example provided as Figure 1). The EMR shall then evaluate the source and content of the inquiry.

4.2   If the inquiry was received verbally from an interested party within WWC Division, the EMR shall respond verbally, briefly note the content of the response on DD-F-001.0, and enter the date the response was made.

4.3   If the inquiry is in the form of a written complaint or request for specific information from an interested party from outside the Division, the EMR shall confer with the WWC Deputy Director or appropriate Section Manager(s) and determine an appropriate response. If a verbal response is determined to be appropriate, the EMR shall make the contact and record the action in the log as noted in Step 2.

4.4   If a letter or other documented response is required, the EMR shall prepare a draft for the Deputy Director's review, and shall resolve any comments prior to transmittal. Requests for copies of WWC Division's environmental policy (Section 2 of the WWC Division's Environmental Management Plan) shall be honored in all cases. The EMR shall record the type of response on the log, and enter the date of the response.

4.5   Completed Environmental Communications Log pages and associated incoming and outgoing correspondence shall be retained as environmental records in compliance with Section 5.3 of the WWC Division Environmental Management Plan.

4.6   Section Managers will respond to inquiries concerning the performance of their direct staff. The Section Manager may direct inquiries to the EMR.

4.7   The procedures for handling of media communication shall be as follows:

4.7.1 All questions and calls from the press have to be channeled to the MWWD Public Information Officer (PIO).

4.7.2 The PIO shall make reference to Corporate Communication Department prior to any news release to media.

4.7.3 The EMR shall log the details of the media communication when issued by the PIO in Master Log (Figures 2).

5.0   REFERENCES

WWC Division Environmental Management Plan
        Section 2, Environmental Policy
        Section 4.3, Communications
        Section 5.3, Records
WWC Division Sanitary Sewer Overflow Response and tracking Plan (SORTP)

Figure 1

Form DD-F-001.0
External Communications Record

Date Communication Received	
Type of Communication (circle one)	Internal External
Received From	
Address/Telephone Number/ E-Mail	
Content of Communication (attach copy if possible)	
Will Organization Respond?	YES NO
Date of Response	
Person Responding	
Position	
Nature of Response (attach copy if possible)	
Are Internal Actions Necessary? (If Yes, fill out a Corrective & Preventive Action Form, DD-F-006.0.	

Contact Person: _____

Date Completed: _____

Log No.: _____

Figure 2

External Communications Tracking Log Master List

EXTERNAL COMMUNICATIONS TRACKING LOG MASTER LIST

LOG NO.	DATE RECEIVED	RECEIVED BY	DATE ACTION TAKEN
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
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_____	_____	_____	_____
_____	_____	_____	_____

SAMPLE EMS DOCUMENTATION

DOCUMENT CONTROL AND RECORD MANAGEMENT

Charleston CPW – Document Control Procedure
Charleston CPW – Record Management Procedure
City of Eugene WWTP – Records Procedure
Kent County DPW – Controlling Documents Procedure

CPW ENVIRONMENTAL MANAGEMENT SYSTEM PROCEDURE

The on-line version and secured hardcopy are the controlled documents. The secured hardcopy will be identified by an "Official Document" stamp giving date of distribution. Any and all other documents are uncontrolled. Contact the EMS Program Manager for revision level status.

Effective Date:	**October 1, 2000**	**Page 1 of 2**
Revision: 3	**Identification Number: EMS – 4.4.5**	
Title:	**Environmental Management System Document Control Procedure**	
Prepared By:	**EMS Procedures Subcommittee**	
Reviewed By:	**EMS Management Steering Committee**	
Approved By:	**William E. Koopman Jr., General Manager**	
	John Cook PE, Assistant General Manager	
Date Approved;	**August 25, 2000**	

0.0 Requirement   ISO 14001; Sub Clause 4.4.5
South Carolina Department of Archives and History. Division of Archives and Records Management

1.0 Purpose
This document describes the procedure to be followed for the approval, issue, and maintenance of all environmental management system (EMS) controlled documentation.

2.0 Scope
This procedure shall apply to all CPW EMS controlled documentation.

3.0 Responsibility & Authority

All EMS controlled documentation shall be subject to approval by the following before issue and release:

a)   General Manager and Assistant General Manager for EMS Procedures affecting all CPW departments
b)   Section Head and/or Department Head for site specific EMS documentation
c)   EMS Program Manager for ISO 14000 EMS documentation

4.0 Procedure

4.1   EMS procedures, processes, work instructions, associated records shall be defined, appropriately documented and updated as necessary. Each department

will clearly define the various types of documents and records which establish the EMS.

4.2 A record (master list) of EMS controlled documentation affecting all CPW organizations shall be maintained within Information Services. EMS documentation (i.e., procedures or work instructions, records) which are specific to a department, shall be maintained and controlled within the department and include:

    1) Reference number
    2) Issue number
    3) Disposition of copies

4.3 Distributed copies of EMS controlled documents shall be stamped "Official Document" with the date of distribution.

4.4 All EMS official documents will be of a standard format and contain the following:

- Effective date of distribution
- Number of document pages
- Revision number
- Title of document
- Preparer (originator) of document
- Approval authority (original on file if published electronically)
- Identification number

4.5 Distribution of EMS "official documents" may be published electronically with read only status. The original paper document with approval signature shall be retained on file.

4.6 All copies of EMS documentation that become obsolete by reissue shall be promptly removed, marked obsolete and handled in accordance with the "EMS Records Procedure."

5.0 Related Documents and Data
    5.1 South Carolina Local Government Records Manual
    5.2 EMS Records Procedure

_____

Effective Date:	**October 1, 2000**	**Page 1 of** 4
Revision: 3	**Identification Number: EMS – 4.5.3**	
Title:	**EMS Records Procedure**	
Prepared By:	**EMS Procedures Subcommittee**	
Reviewed By:	**EMS Management Steering Committee**	
Approved By:	**William E. Koopman Jr., General Manager**	
	John Cook PE, Assistant General Manager	
Date Approved:	**August 25, 2000**	

_____

0. 0 Requirement: ISO 14001, Sub Clause 4.5.3; Records Management, Section 30-1-80, <u>Code of Laws of South Carolina,</u> <u>1976</u> as amended.

1.0 Purpose*:*

The purpose of this procedure is to define the steps that CPW follows to ensure that environmental management system (EMS) records are properly identified, collected, indexed and filed to allow for ready access and retrieval.

NOTE: All records created or received by the Commissioners of Public Works during the course of business are considered public records and as such are governed by Section 30-1-80, <u>Code of Laws of South Carolina,</u> <u>1976</u>, as amended. It will be the duty of the Commission to establish and maintain an active and continuing records program in compliance with all statutory guidelines, and to provide for the economical and efficient management of all Commission records from their creation or receipt, through their ultimate disposition.

2.0 Scope:

    2.1   This procedure applies to EMS CPW records that associates use, handle or maintain.

    2.2   The EMS Records Procedure will provide for:

        1.) Record Generation

        2.) Record Review

        3.) Active Records Storage

        4.) Inactive Record Retirement

    2.3   Definition of Terms

        Active Records - Records that must be maintained in office space because they are referred to once a month or more and are needed to conduct daily business.

Disposition - The final action that puts into effect the results of an appraisal decision for a series of records. Transfer to an archival repository, transfer to a records center, or destruction are some possible disposition actions.

Document – Recorded information, regardless of form or medium. Also called record or documentary material.

Environmental Management System (EMS) Record Records that are defined as EMS records by the department and listed on the Master Control Document Register as records necessary to maintain conformance with the EMS and ISO 14001 requirements.

Inactive Records - Records referred to less than once a month and are suitable for storage outside of the immediate office.

Record – Recorded information, regardless of physical form or characteristics of the medium (e.g. paper, photograph, sound records, or computer generated, machine readable record) made or received by an organization to fulfil its legal obligations or to transact business.

Records Retention/Disposition Schedule – Document that specifies actions for the retention and disposition of current, inactive, and non-current records series of an organization or agency.

Record Series – Documents arranged according to a filing system or maintained as a unit because they relate to a particular subject or function, result from the same activity, have a particular form, or share some other relationship arising out of their creation, receipt, or use.

Scheduling – The action of establishing retention periods for records and providing for their proper disposition at the end of active use. See Records Retention/Disposition Schedule.

3.0 Responsibility and Authority

3.1   The department document control representative ensures that EMS records are properly identified, collected indexed, filed, and stored to allow for ready access and retrieval, at the department level, and that these records are properly disposed in accordance with the CPW Records Management Policy RM-PM-01.

3.2   The Records Retention Specialist/Information Services will provide for:
1.)   Inventory, appraisal, and scheduling of records according to the policies and procedures as set forth by the South Carolina Department of Archives and History and the EMS;
2.)   Preservation and restoration of records deemed to be of vital, continuing, or enduring value;
3.)   Destruction of records which have outlived their administrative, legal, or fiscal value;
4.)   Transfer and maintenance of inactive and semi-active office records to approved storage facilities;

     5.)   Reporting of all required program information to the South Carolina Department of Archives and History;

     6.)   Disaster preparedness and recovery efforts for CPW records.

4.0 Procedure

4.1 EMS Record Generation

When an EMS record is needed or generated, the appropriate associate (specified in the procedure or work instruction) completes the record.

4.2 EMS Record Review

The associate conducts a review of the EMS record and forwards the record to the document control representative for review and filing.

NOTE: The EMS record's review ensures that:

    1.)   The record is complete and legible;

    2.)   Signatures and initials are filled in where necessary;

    3.)   The information contained in the record is correct and has not been improperly altered;

    4.)   Any errors that have been made in the record have been properly corrected, (a single line drawn through the error) the correction initialed and dated;

    5.)   The record has an approved Record Retention Schedule authorizing its final disposition.

NOTE: It will be the responsibility of the department document control representative to notify the Records Retention Specialist/Information Services of all new EMS record series. A Record Series Inventory Form will be completed by the document control representative for each record series and forwarded along with pertinent information to the Record Retention Specialist

4.3 Active Record Storage

The department document control representative reviews the EMS record for completeness and accuracy and either sends the record back for correction or files the record according to procedure.

NOTE: Containers for storing active records within the department may be folders, file cabinets, boxes, computer directories, etc., provided they allow the record to be properly identified and stored so as to minimize deterioration, damage, or loss.

4.4 Record Retrieval

When a record is removed from filing the person will check out the record in accordance with department procedures.

4.5 EMS Records Purge

Annually or when quantity warrants, the document control representative (or designee) purges all EMS records that are past their retention period and disposes of them according to the CPW Records Management Policy RM-PM-01.

4.6 Inactive EMS Records Retirement
EMS Records that are infrequently needed but must be kept for a specific amount of time for legal, fiscal or administrative reference value should be transferred to inactive records storage in accordance with the CPW Records Management Policy RM-PM-01.

4.7 Inactive EMS Records Retrieval
Requests for EMS record retrieval can be made via telephone, electronically, or in writing. All requests for EMS records placed in storage are to be made through the Records Retention Specialist and/or the document control representative for the respective department in accordance with the CPW Records Management Policy RM-PM-01.

4.8 Final Records Disposition
EMS records must be disposed of in accordance with the CPW Records Management Policy RM-PM-01

5.0 Related Documents and Data

5.1 Document Control Procedure (EMS-4.4.5)
5.2 SC Department of Archives and History Record Series Inventory Form - RS-I-1(90) (EMS-4.5.3 -2)
5.3 SC Department of Archives and History Records Retention Schedule Document - RS-S2(91)(EMS-4.5.3 -3)
5.4 CPW Records Transfer List Document – RTL3.97 (EMS-4.5.3 -4)
5.5 CPW Records Disposal Authorization Document RDR3.97 (EMS-4.5.3 -5)
5.6 SC Department of Archives and History Microfilm Quality Certification for Records Disposition – TEMP-61(3/93) (EMS-4.5.3 -6)
5.7 SC Department of Archives and History Authorization for Disposal of Original Paper Records Stored in Optical Disk Systems (TEMP–80 2/95) (EMS-4.5.3 -7)
5.8 SC Department of Archives and History Microfilm Transmittal and Receipt – ARM – 8A(94) (EMS-4.5.3-8)
5.9 Inactive Record Charge-Out (EMS-4.5.3-9)
5.10 CPW Records Management Policy RM-PM-01

CITY OF EUGENE – WASTEWATER DIVISION
Procedure

Subject:	Records			Document No.	WW-00017
Last Reviewed By:	Linda Delaplain	Original Date:	4/28/00	Revision No.:	2
Approved By:	Management Team			Date Approved:	9/10/03

Purpose

This procedure describes the process to be used for maintaining all records stored by the Division. These records include internal records such as audit records; old versions of revised policies, procedures, and work instructions; records stored in databases (including training, maintenance system, laboratory system, chemical inventory system, distributed control system, etc.; instrument maintenance records; all completed data forms; and other documentation that provides documentation of the Divisions activities. External records include contracts, permits, and other documents that are provided by outside sources.

Scope

This procedure applies to all records that may be stored for the Division in the document imaging system, manual files, databases, or archive files.

- New Records
- Record Retention and Disposal

Definitions

- Archive Files – all records stored in Centrifuge Building are referred to as archive files
- Document Control
- Document Imaging System
- Manual Files
- Record Owner
- Records

Safety Requirements

All specific safety requirements will be included or referred to in specific work instructions.

Procedure (Include reporting requirements and precautionary steps in this section)

Accountability: **Responsibility:**

New Records

Division Staff   Create and/or receive documentation to be maintained as a record for the Division.

Route record to Document Control Staff.

NOTE: If record is to be stored in archives, provide list of documents to be stored to Document Control Staff.

Document Control Staff   Receive document(s) to be stored as a record(s).

Determine filing location of record.

- If record is to be maintained as an image, scan the document into Laserfiche.

- If record is to be filed in the manual files, file.

- If record is to be archived, enter into archive database, print label for archive box and attach to box, route to archive storage.

- If the record is a training record, enter into training database. Route all Training Verification Forms to Laserfiche for scanning.

Record Retention and Disposal

Document Control Staff   On an annual basis, review all records and their retention times. Identify records that are eligible for disposal using the Record Retention Schedule. Route Record Disposal Report to record owner for authorization to dispose of the record.

Division Staff   Review list of records eligible for disposal. Approve records for disposal or note new date for disposal. Route Record Disposal Report back to Document Control Staff.

Document Control Staff   Make changes noted on the Record Disposal Report related to disposal dates. Routes revised Record Disposal Report to Division Management Team for approval.

Division Management Team   Reviews Record Disposal Report, approves or denies records for disposal, and routes back to Document Control Staff.

References

- ISO 14001 Standard, 4.5.3 Records
- EMS Manual, Records Policy
- Record Retention Schedule

CONTENTS

1.0   PURPOSE

1.1   The purpose of this procedure is to establish the general requirements for the work process of controlling documents at the Kent County Dept. of Public Works Regional Wastewater Treatment Facility.

1.2   The purpose of this work process is to establish the Kent County Dept. of Public Works Document and Data Control specification.

2.0   SCOPE

2.1   This procedure addresses all documents and data relating to the requirements of ISO 14000, including documents of external origin as applicable, including:

    (a)   Environmental Program Manual
    (b)   Procedures
    (c)   Process Instructions
    (d)   Design Output and Change Documentation
    (e)   Special Process Control Documentation
    (f)   Associated Reference Documentation and Lists

2.2   Environmental Management System Records are handled in accordance with the Kent County Dept. of Public Works Environmental Management System Procedure 2-11-P01.

3.0   DEFINITIONS

3.1   *Approved Document or Data* - Any informational or instructional paper, drawing, microfiche, microfilm, electronic data, magnetic tape or disc which has been formally approved for issue. This includes, but is not limited to, the following: guides, manuals, procedures, process instructions, regulations, rules, specifications and standards.

3.2 *Controlled Copy* - Any copy of an approved document issued to a particular branch, department or individual, which has been uniquely identified as a "Controlled Copy" and is traceable for recall. The use of a controlled copy ensures that work affecting process safety is performed to the applicable revision of the document, and that the current revision status is established.

3.3 *Environmental Program Document Control* - Control of documents related to the environmental program used to manage and oversee the environmental program.

3.4 *EMS Librarian* – The person responsible for maintaining all controlled documents and updating the documents as they are revised.

3.5 *Traceability* - For documentation, the ability to preserve the revision identity of a copy from its point of issuance to its assigned recipient so that it can be identified or recalled as required.

4.0   REFERENCES

None

5.0   REQUIREMENTS

5.1   *Classes of Documentation*

There are three classes of documentation represented by policy, procedures and process instructions:

5.1.1   Documents produced internally, for example the Environmental Management System documents and the program element procedures and process instructions;

5.1.2   Documents produced outside Kent County Dept. of Public Works, but approved for use as references, for example standards and codes of government or industry organizations pertaining to the work process undertaken by Kent County Dept. of Public Works permanent or contract personnel; and

5.1.3   Incoming documentation, that is to be verified on receipt such as vendor-supplied documents.

5.2   *Issuing and Maintaining Controlled Documents*

5.2.1   Controlled Documents – In order to ensure that only the latest edition of any one Environmental Management System document is being used it is necessary to ensure that the release of the appropriate document is controlled.

5.2.2   Control of all EMS documents shall be the responsibility of the EMS Librarian. As each revision is prepared, the approved document shall be submitted to the EMS Librarian for inclusion in the control system.

5.2.3   All documents shall be maintained in Adobe Acrobat 5.0 "pdf" form on the central network V drive. The EMS Librarian shall ensure that the document is converted to "pdf" format. It shall be secured so that it cannot be modified without a specific password.

5.2.4   All controlled documents shall be available to staff via the Adobe Acrobat Reader.

5.2.5   Once a document is printed, it shall be considered uncontrolled, unless stamped "Controlled" by the EMS Librarian. Such documents shall expire within 90 days of issuance, and must be reissued for additional 90-day periods.

5.2.6   In addition, a statement shall be added to the document that reads "This document is an UNCONTROLLED DOCUMENT, valid only on _____ (the day it is printed), unless stamped CONTROLLED COPY in red ink."

5.3   *Control*

5.3.1   The Environmental Management System Manual, Procedures, and Work Instructions shall be controlled in accordance with this procedure. Numbering of these documents is described in the Kent County Dept. of Public Works Environmental Management System Procedure 2-10-P01.

5.3.2   A controlled Copy Issuance list shall be maintained under the authority of the Environmental Program Manager and in accordance with the Environmental Management System Procedure 2-12-P02, Establishing and Maintaining Libraries.

5.3.3   Documents prepared under this program shall also be maintained using the Greenware software package.

5.4   *Approval*

Document approval authority is given by category as follows:

5.3.1   The Environmental Management System Manual, Procedures, and Work Instructions approval shall be as indicated in the Kent County Dept. of Public Works Environmental Management System Procedure 2-10-P01, Developing Policies, Procedures and Work Instructions.

5.3.2   Environmental Management System design output, change documentation and process control documentation, including Approved Lists, shall be approved by the appropriate Manager, as described in the Kent County Dept. of Public Works Environmental Management System Procedure 2-01-P01.

5.3.3   Reference documentation is considered approved by virtue of reference in the base document.

5.4   *Approved Lists*

Approved lists shall be maintained by category as follows:

The Environmental Management System Manual, Procedures, and Process Instructions, shall be listed on an "Environmental Management System Documents List", maintained under the authority of the Environmental Program Manager (Reference Kent County Dept. of Public Works Environmental Management System Procedure 2-10-P01).

5.5   *Reference Documentation*

Environmental Management System reference documentation shall be listed under an "Approved Reference Documents" section of the library catalog, maintained under the authority of the Environmental Program Manager (reference the Kent County Dept. of Public Works Environmental Management System Procedure 2-12-P02 Establishing and Maintaining Libraries).

5.6   *Environmental Management System Records*

Environmental Management System Records shall be maintained under the authority of the department or unit administrative personnel.

5.7   *Approved Forms*

An Environmental Management System Approved Forms list shall be maintained under the authority of the Environmental Program Manager (Reference the Kent County dept. of Public Works Environmental Management System Procedure 2-11-P02 Controlling Records).

5.8   *Corrective Action*

A master CAR list shall be maintained under the authority of the Environmental Program Manager (Reference the Kent County Dept. of Public Works Environmental Management System Procedure 2-15-P01 Controlling Non-Conforming Conditions and 2-15-P02 Managing Corrective and Preventive Action).

6.0   <u>RESPONSIBILITIES</u>

The responsibility for Kent County Dept. of Public Works Library(s) rests with each of the Department Management Representatives responsible and shall be coordinated with the Environmental Program Manager for technical consistency.

7.0   <u>DOCUMENTS</u>

7.1   *Related Documents*

     7.1.1 Kent County Dept. of Public Works Environmental Management System Manual Section 2 Management System

     7.1.2   Kent County Dept. of Public Works Environmental Manual Section 5 Environmental Work Processes

8.0   <u>RECORDS</u>

8.1   *Required Records*

     A listing of library documents is to be maintained by the Environmental Program Manager and responsible Management or Supervisory personnel to facilitate retrievability of the documents and up-to-date information.

8.2   *Records Control*

     All records, if required, pertaining to this procedure shall be controlled in accordance with the Environmental Management System Procedures 2-11-P02, Controlling Records.

8.3   *Transmittal Confirmations*

     Transmittal Confirmations are Environmental Management System Records and shall be maintained in accordance with the Kent County Dept. of Public Works Environmental Management System Procedure 2-11-P02 Controlling Records.

9.0   <u>ATTACHMENTS</u>

9.1   None

10.0   <u>REVISION HISTORY</u>

Revision No.	Effective Date	Responsible Person	Description of Revision	Appv. By
0		Jim Newton	Initial Issue	

SAMPLE EMS DOCUMENTATION

ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) MANUAL

City of Gastonia WWTP – EMS Manual

City of Gastonia
Wastewater Treatment Division

ISO 14001 - Environmental Management System Manual

Prepared By: Beth Eckert, Industrial Chemist
Approved By: Coleman Keeter, Superintendent of WWTD

Signature: _____

Revision #: 0 / Revision Date: December 7, 1999 / Effective Date: January 1, 2000

TABLE OF CONTENTS

SECTION I - INTRODUCTION

The City of Gastonia's Wastewater Treatment Division (GWWTD) is responsible for treating Gastonia's industrial, commercial, and domestic wastewater to meet state and federal limits for discharge to the surface waters as well as for proper management of its biosolids. Gastonia has two wastewater treatment operations that are designated for these activities. Additionally, the WWTD manages a resource recovery farm and the operations of a contractor that is responsible for land application of biosolids at permitted locations throughout the county.

Wastewater Treatment Operations
Crowder's Creek Wastewater Treatment Plant, 5642 South York Road, Gastonia, NC 28054
Long Creek Wastewater Treatment Plant, 3000 Long Creek Disposal Plant Rd., Dallas, NC 28034
Resource Recovery Farm, 208 Goldmine Rd., Bessemer City, NC

In order to improve management of environmental issues related to these operations and sites, the Gastonia Wastewater Treatment Division has implemented an ISO 14001 environmental management system. This Environmental Management System (EMS) manual presents the environmental policy, structure of the management system, and related documents for the Gastonia Wastewater Treatment Division.

The EMS is designed according to the requirements set forth by the ISO-14001 Standard. Sections 4.2-4.6 parallel the ISO-14001 Standard number scheme. Each of these sections provide specific information or instructions necessary for complying with the requirements in the ISO-14001 Standard.

The EMS manual is the responsibility of the EMS Project Coordinator and is to be reviewed yearly and updated as appropriate, see review procedure (**EMS-0100.001**). The issued copies of this manual are under control of the EMS Project Coordinator.

SECTION II - DISTRIBUTION, REVISION, AND CONTROL

The distribution of this manual shall be conducted manually by the EMS Project Coordinator. The version accessed on the computer system shall be considered the "controlled" copy. There will be a "Master Copy" in hard copy form maintained by the EMS Project Coordinator. This copy shall have the signature of the Superintendent of the Wastewater Treatment Division and the date of approval.

Any part of the manual in hard copy form, other than the master copy and controlled copies issued per the distribution list, shall be considered "UNCONTROLLED" and will have "****THIS IS AN UNCONTROLLED COPY OF A CONTROLLED DOCUMENT****" automatically inserted at the bottom of each page when printed.

The manual will be reviewed a minimum of once per year. The EMS Management Team shall have the responsibility for reviewing the manual annually in **October**.

Recommendations for revisions shall be forwarded to the EMS Project Coordinator. The EMS Project Coordinator will be responsible for all revisions to the manual. He/she will maintain a record of external distribution, if applicable, and maintain obsolete copies on file.

This manual will be controlled manually and in accordance with the Gastonia Document Control Procedure (**EMS-0100.002)**.

SECTION 4.2 - ENVIRONMENTAL POLICY

The EMS Management Team will review the policy annually. If revisions are necessary, the revised policy will be adopted by the City Council in **November**.

The policy will be made available to the public through the City of Gastonia's web-site. The policy will be communicated to all WWTD employees through training events.

<div align="center">

CITY OF GASTONIA
WASTEWATER TREATMENT DIVISION

ENVIRONMENTAL POLICY

</div>

The City of Gastonia Wastewater Treatment Division is committed to the implementation of a management system which will minimize negative and advance positive impacts on the environment and which will control the wastewater treatment costs to be borne by the consumer. Believing these goals to be fully achievable, the Wastewater Treatment Division is firmly committed to and will:

- Establish procedures to promote continuing improvement of compliance with all applicable environmental laws and regulations.

- Establish procedures to continue efforts to strengthen and improve knowledge of environmental issues within the Division.

- Seek optimal operation of the Wastewater Treatment Facilities to minimize environmental impacts where technically and economically feasible, even if not required by law or regulation.

- Promote cooperation and understanding with the public, customers, and governmental agencies in developing economically feasible and environmentally sound wastewater treatment objectives.

- Continue to promptly report all noncompliance issues in accordance with applicable governmental reporting requirements, evaluate causes of noncompliance, and implement corrective actions.

- Establish procedures for periodic review of environmental compliance with all laws and regulations, as well as with the ISO 14001 Environmental Management System.

- Establish procedures to ensure all that employees are knowledgeable of, and understand and comply with, all applicable environmental laws and regulations.

- Promptly correct any practice or condition not in compliance with this policy.

All employees are expected to comply with the spirit as well as the letter of this policy.

SECTION 4.3 - PLANNING

Location and description of all reference materials has been identified the Document Control / Training Matrix (**EMS-0101.002A**) which is located electronically at **U:\ISO\Forms\EMS-0101.002A** and a hard copy in the office of EMS Coordinator.

The following definitions are provided in the ISO-14000 Standards.

4.3.1 Environmental Aspects

Environmental Aspects - Elements of the organization's activities, products or services which can interact with the environment.

Environmental Impact - Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

Significant Environmental Aspect - An environmental aspect that has or can have a significant environmental impact.

GWWTD has identified all known environmental aspects and related impacts of our activities and products that we can control and have influence over in order to determine which can have a significant impact on the environment.

The EMS Management Team shall review at least annually per the EMS Review procedure (**EMS-0100.001**) the list of environmental aspects and impacts and identify the significant aspects using the Aspects and Impacts procedure (**EMS-0100.003**), aspects ranking form (**EMS-0101.003A**), significant aspects determination form (**EMS-0101.003B**), and the significant aspect listing form (**EMS-0101.003C**). The EMS management team will also review aspects and impacts of any new operations, activities, or laws for significance determination. Significant aspects will be considered in setting the environmental objectives.

The EMS management team will consist of the following personnel:

ORC Crowder's WWTP
Lab Supervisor Crowder's WWTP
ORC Long Creek WWTP
Lab Supervisor Long Creek WWTP
ORC of Biosolids
Assistant Superintendent of WWTD
Pretreatment Coordinator

The list of environmental aspects, related impacts and identified significant aspects and impacts will be kept up to date. The list will be comprehensively reviewed annually in November.

4.3.2 Legal and Other Requirements

The Gastonia Wastewater Treatment Division is required to comply with a variety of legal and other requirements that are applicable to the environmental aspects of its activities, products or services. The following personnel identify environmental regulations and requirements, which govern GWWTD activities and products:

ORC Crowder's WWTP
   Environmental laws relating to treatment and discharge of industrial and municipal wastewater.
Lab Supervisor Crowder's WWTP
   Environmental laws relating to the testing of wastewater samples.
ORC Long Creek WWTP
   Environmental laws relating to treatment and discharge of industrial and municipal wastewater.
Lab Supervisor Long Creek WWTP
   Environmental laws relating to the testing of wastewater samples.
ORC of Biosolids
   Environmental laws relating to the management and application of wastewater treatment plant biosolids.
Assistant Superintendent of WWTD
   Environmental laws relating to the operation of an industrial/municipal wastewater treatment plant.
Pretreatment Coordinator
   Environmental laws related to handling wastewater discharged from commercial or industrial dischargers.

The following resources are used to identify applicable legal and other requirements:

Documents:
CFR books (Code of Federal Regulations) – covers solid waste, hazardous waste, air emission, wastewater, stormwater, biosolids regulations.
EPA Standard Testing Methods – Covers EPA certified wastewater testing procedures.

Regulatory Personnel: direct mailings and discussions with regulators. Representative personnel attend seminars.

Software: Application which is designed for fast regulatory searches. (CD-ROM)
Internet Access – Review of EPA newsletter

Regulator Training: plant personnel shall attend Conferences and workshops with key environmental responsibility on a regular basis to maintain up-to-date knowledge of current and upcoming regulatory requirements.

Periodic permitting and reporting requirements are documented and reviewed for accuracy as identified in the Legal and Other Requirements listing (**EMS-0101.001**).

All employees affected by new regulations will be trained on those regulations by their supervisor according to individual training matrices (**EMS-0101.002B**).

4.3.3 Objectives and Targets

GWWTD establishes environmental objectives and targets annually during **December** by considering at least the following information:

➢ Legal and other requirements
➢ Significant environmental aspects and impacts
➢ Prevention of pollution
➢ Technological options
➢ Financial, operational, and business requirements
➢ GWWTD environmental policy
➢ Views of interested parties

These objectives and targets will be documented and maintained according to the objectives and targets procedure (**EMS-0100.007**) and the EMS review procedure (**EMS-0100.001**). Objective and targets may be amended at other times during the year as a result of new or revised operations, activities, and/or regulations.

4.3.4 Environmental Management Programs

GWWTD has developed an EMS program entitled Objectives and Targets Improvement Plan (**EMS-0101.007**) that shall be used to achieve its objectives and targets. This program shall include:

➢ designation of responsibility for achieving the objectives and targets at each relevant function and level of organization;
➢ means and time-frame by which they are to be achieved.

The objectives, targets, and programs will be reviewed and approved annually per the EMS review procedure (**EMS-0101.001**) by the Superintendent of the WWTD during the budget development process. The EMS Project Coordinator is responsible for their maintenance and reporting. Projects that relate to new developments and new or modified activities, products or services, the program shall be amended where relevant to ensure that environmental management applies to such projects.

SECTION 4.4 - IMPLEMENTATION & OPERATION

4.4.1 Structure and Responsibility

GWWTD has defined, documented and communicated the roles, responsibility and authority of personnel in order to facilitate effective environmental management. These are identified in the roles and responsibilities listing (**EMS-0100.006**).

The Superintendent of the WWTD is responsible for assuring that adequate human resources, other resources, and training are available to implement and control this EMS.

The EMS Project Coordinator is responsible for ensuring that this EMS is established, implemented and maintained and for reporting on its performance to top management

4.4.2 Training, Awareness and Competence

All employees within the WWTD will be trained on the EMS policy and records maintained in the office of the EMS Coordinator. Based on the annual aspects and impacts analysis each department shall identify training needs for those employees whose work activities may create a significant impact upon the environment. All procedural training records will be maintained in each area supervisor's office. Relevant procedures identified in the Document Control / Training Matrix (**EMS-0101.002A**) shall be established and maintained to ensure employees are aware of:

➢ The importance of conformance with the environmental policy and procedures and with the requirements of the Environmental Management System;
➢ The significant environmental impacts, actual or potential of their work activities and the environmental benefits of improved personal performance;
➢ Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the Environmental Management System, including emergency preparedness and response requirements;
➢ The potential consequences of departure from specified operating procedures.

Personnel performing the tasks, which can cause a significant environmental impact on the environment, shall be evaluated for competence on the basis of appropriate education, training, and/or experience as identified in the roles and responsibilities listing (**EMS-0100.006**). Records of competency and individual training are maintained in the individual training matrices (**EMS-0101.002B**). During annual performance reviews employees will be evaluated on their demonstration of environmental competency.

All new employees will receive training on EMS related procedures, policy and requirements of the environmental management system upon commencement of work with the City of Gastonia via PowerPoint presentation located at **U:\ISO\training\ISOawareness training**. New or revised procedures affecting existing personnel will be communicated upon implementation.

Training requirements of contractor personnel will be established under the terms of contract. Follow-up will be done annually to evaluate conformance with the contract. City of Gastonia maintenance personnel will be

trained on procedures identified in the Document Control / Training Matrix.

4.4.3 Communication

GWWTD has developed procedures for handling internal communications between the various levels and functions of the department. The EMS Project Coordinator is responsible for communicating information relative to the EMS to upper management and the EMS Team. The EMS Team is responsible for communicating information to affected employees.

GWWTD has documented a procedure for receiving, documenting, and responding to relevant communications from external parties (**EMS-0100.008**).

GWWTD has recorded its decision on considering processes for external communication of its significant environmental aspects. GWWTD will provide a listing of its significant environmental impacts to any interested party. Additionally, the GWWTD has held a seminar for external parties to discuss significant environmental impacts.

4.4.4 Environmental Management System Documentation

GWWTD has developed an EMS documentation system that is organized in a four-tier structure

EMS Manual	Level 1
EMS Procedures	Level 2
Standard Operating Procedures/Work Instructions	Level 3
Forms/Records	Level 4

Each of these levels will provide direction to relative documents in other levels.

4.4.5 Document Control

GWWTD has established a Document Control System that controls all documents and data that relate to satisfying the elements of the ISO 14001 standard and ensures:

➢ they can be located;
➢ they are periodically reviewed, revised as necessary and approved for adequacy by authorized personnel;
➢ the current versions of relevant documents are available at all locations where operations could significantly impact the environment;
➢ obsolete documents are assured against accidental use and those retained for legal or knowledge preservation suitably identified;
➢ they are legible, dated, readily identifiable and properly stored.

GWWTD has developed procedures and responsibilities concerning the creation and modification of various types of documents as identified in the Document Control Procedure (**EMS-0100.002**).

4.4.6 Operational Control

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GWWTD has identified operations and activities associated with the identified significant environmental aspects. Each department shall plan these activities, including maintenance, in order to ensure they are carried out under specified conditions by:

➢ Establishing and maintaining documented standard procedures to cover situations where their absence could lead to deviations from the environmental policy, objectives and targets;
➢ Stipulating operating criteria in the procedures;
➢ Establishing and maintaining procedures related to supplies and services used by the plant and communicating relevant procedures and requirements to suppliers and contractors.

All operating procedures are identified in the document control / training matrix (**EMS-0101.002A**)

4.4.7 Emergency Preparedness and Response

GWWTD has developed an emergency response plan (**WLC-0100.010 and WCR-0100.010**) and a Risk Management Plan (**EMS-0100.010**) which deals specifically with Chlorine and/or Sulfur dioxide related emergencies. The plan identifies the potential for accidents and emergency situations and the corresponding response. The plan also considers the prevention and mitigation of any environmental impacts associated with accidents or emergency situations.

These plans shall be reviewed at least every three years.

SECTION 4.5 CHECKING AND CORRECTIVE ACTION

4.5.1 Monitoring and Measurement

GWWTD has established and maintains a system for measuring and monitoring the key characteristics of our operations that can have a significant impact on the environment. This system includes recording information to track performance, relevant operational controls and conformance with the established objectives and targets.

➢ Monitoring equipment shall be calibrated and maintained and records kept in the office of the responsible supervisor.
➢ A documented procedure (**EMS-0100.009**) has been established to periodically evaluate compliance with relevant environmental legislation and regulation.

4.5.2 Non-Conformance and Corrective Action

GWWTD has established and maintains a procedure to determine the need for and implementing corrective and preventative actions (**EMS-0100.004**).

➢ All employees are empowered to report, document and take temporary action for any nonconformities relating to environmental impacts.
➢ Corrective and preventative actions are taken to eliminate the causes of actual or potential

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nonconformities and are appropriate to the magnitude of problems and commensurate with the environmental impact.
➢ Changes to documented procedures resulting from corrective or preventative actions are recorded.

4.5.3 Records Management

GWWTD has established procedures for identification, maintenance, and disposition of all environmental records. These records are kept to demonstrate conformance to GWWTD's EMS, the ISO 14001 standard and applicable regulations.

➢ Environmental records are legible, identifiable, and traceable to the corresponding activity or product involved.
➢ Environmental records are stored in a way that they are retrievable and protected against damage, deterioration or loss.
➢ The retention times for all environmental records are established and recorded.

Refer to the Document Control / Training Matrix (**EMS-0101.002A**) and /or the Legal and Other Requirements (**EMS-0101.001**) documents for retention times and locations.

4.5.4 Environmental Management System Audits

GWWTD has established and maintains procedures to carry out periodic audits of the environmental management system (EMS). The EMS audit procedure (**EMS-0100.011**) will determine the scope, frequency, methodology, and responsibility for the audits.

➢ The purpose of audits is to determine if the EMS has been properly implemented and maintained.
➢ Results of the EMS audits are reviewed with the Management Review Board (MRB).

SECTION 4.6 MANAGEMENT REVIEW

The Management Review Board (MRB) reviews the EMS quarterly to ensure continuing suitability, adequacy, and effectiveness of the EMS. This review is documented.

The MRB addresses the possible need for changes to the policy, objectives, and other elements of the EMS. Observations, conclusions and recommendations are document for necessary action and changes

SAMPLE EMS DOCUMENTATION

OPERATIONAL CONTROL

Charleston CPW – Operational Control Procedure
City of San Diego WWC – Operational Control Procedure

CPW ENVIRONMENTAL MANAGEMENT SYSTEM PROCEDURE

The on-line version and secured hardcopy are the controlled documents. The secured hardcopy will be identified by an "Official Document" stamp giving date of distribution. Any and all other documents are uncontrolled. Contact EMS Program Manager for revision level status.

Effective Date:	**October 1, 2000**	**Page 1 of 3**
Revision: 1	**Identification Number: EMS – 4. 4. 6 (A)**	
Title:	**Operational Control Procedure**	
Prepared By:	**EMS Procedures Subcommittee**	
Reviewed By:	**EMS Management Steering Committee**	
Approved By:	**William E. Koopman Jr., General Manager**	
	John Cook PE, Assistant General Manager	
Date Approved:	**August 25, 2000**	

0.0 Requirement: ISO 14001, Sub Clause 4.4.6 Operational Control

1.0 Purpose

This procedure is used to ensure monitoring and operating instructions are properly identified, issued and controlled, and to ensure that all relevant documents necessary for the proper operation of the process are present.

2.0 Scope

This procedure applies to all associates who issue and control monitoring and operating instructions at CPW where EMS requirements are in place.

3.0 Responsibility & Authority

    3.1 The department head (or designee) is responsible for the approval, revision, and issuance of monitoring and operating instructions and ensuring associates have the necessary training to perform the job.

4.0 Procedure

    4.1 Issue and Control of Monitoring and Operating Instructions

Effective Date: **October 1, 2000**   **Page 2 of 3**
Revision: 1   **Identification Number: EMS – 4. 4. 6 (A)**
Title: **Operational Control Procedure**

4.1.1   Prior to placing new or modified monitoring or control equipment in service the department head will direct the drafting of monitoring or operating instructions for that operation.

NOTE: Monitoring and operating instructions should include the following information where relevant:

- Monitoring and Operating Instruction Title and Identification Number
- Process or equipment name
- Operating criteria
- Startup instructions
- Shut down instructions
- Emergency operation (loss of power, SCADA, etc)
- Inspection and test instructions
- Corrective action instructions
- Revision date and approval
- Safety requirements
- Housekeeping
- Location of manufacturer's reference material

4.1.2   The draft monitoring and operating instructions are submitted to the appropriate supervisor(s) to review for operability, completeness, consistency and clarity.

4.1.3   The supervisor(s) note any changes or concerns and forwards back to the individual or team that prepared the draft.

4.1.4   The individual or team that prepared the draft makes the necessary corrections.

4.1.5   The department head reviews and approves the new or revised monitoring and operating instructions.

4.1.6   The department head (or designee) issues the monitoring and operating instructions to the appropriate supervisor(s).

4.1.7 The supervisor(s) ensures the operators have the necessary training, including the environmental impacts or potential consequences in deviating from the specified work instructions.

4.1.8 The department head (or designee) ensures the documents are available and controlled at all appropriate locations, the most current versions are available for use, and obsolete versions are prevented from further use.

4.1.9 Obsolete documents to be retained for legal and or knowledge preservation are removed and marked "Obsolete.

4.2 Related Documents and Data

4.2.1 Training Records
4.2.2 Records of Change to related documented procedures
4.2.3 Manufacturer's Reference Material
4.2.4 Document Control Procedure

DD-SEOP 4.4.6

OPERATIONAL CONTROL

1.0 PURPOSE AND SCOPE

The procedure for identifying operational controls for operations and activities that are identified as potential critical environmental impacts. This procedure applies to all situations at the MWWD WWC Division, or areas within the control or influence by MWWD WWC Division, where its absence could lead to deviations from the division environmental policy and the objectives and targets.

2.0 RESPONSIBILITY AND AUTHORITY

It is the responsibility of the EMS Environmental Management Representative, Section Managers and their designees to prepare appropriate procedures ensuring effective management of critical control points and for those situations where the absence of a procedure could lead to deviations from the Environmental Policy and the objectives and targets.

3.0 PROCEDURE

3.1   Operational control procedures shall be established by the WWC for operations that have been identified to have significant environmental impacts and/or where their absence could result in significant environmental impacts.

3.2   The Operational control procedures shall be established and maintained by the appropriate WWC Section and may cover the following:

- Process operations, maintenance and equipment specifications criteria
- Methods of chemical storage, handling and transfer
- Spill and clean up
- Management and disposal of wastes
- Operation and Maintenance of Sensitive or Critical Environmental Control Equipment

3.3   Most operational control and maintenance procedures shall be established as the third level documentation (excepting those activities determined to be inter-departmental in nature and that apply to multiple sections within WWC). All procedures shall be made available at the point of use. (refer to Documentation matrix in Document Control procedure, DD SEOP 4.4.5)

3.4   Operational control procedures shall also make reference to existing documented Departmental and/or Division Instructions that cover at least the following or in whose absence may lead to a deviation from the environmental policy:

- Purchase or transfer of goods and services and use of external resources
- Hazardous tasks
- Hazardous materials
- Maintenance of calibrated safety equipment

3.5   The relevant EMS requirements, including the WWC Environmental Policy, shall be communicated to suppliers and contractors.

3.6   The Section manager reviews the "Standard Operating Procedures" (DD-SEOP 4.4.4) for environmental protection and control content and makes improvement to existing procedures, or develops new procedures as required.

3.7   New or revised SOP's are to be processed by the Document Control Group (DCG). DD-SEOP 4.4.5.

3.8   Procedures are reviewed and revised based on corrective actions recommended as the result of environmental incidents (such as spills or releases) or environmental audits; when new processes or products are introduced, or when new environmental regulations are identified that could reasonably affect MWWD WWC Division operations.

3.9   The Section Managers are responsible for approving Section specific Standard Maintenance Procedures (SMP's) or Operating Procedures (SOP's) where the absence of SOP's could lead to a significant environmental impact.

4.0   REFERENCES

DD-SEOP 4.3.1, Environmental Aspects and Impacts Identification

DD-SEOP 4.3.3, Establishment of Environmental Objectives, Targets and Programs

DD-SEOP 4.4.4, Standard Environmental Operating Procedures

DD-SEOP 4.4.5, Document Control

DD-F-002.0, Aspects and Impacts Register

SAMPLE EMS DOCUMENTATION

EMERGENCY PREPAREDNESS

Charleston CPW – Emergency Preparedness & Disaster Recovery Procedure
City of San Diego WWC – Emergency Preparedness and Response Procedure

CPW ENVIRONMENTAL MANAGEMENT SYSTEM PROCEDURE

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Effective Date:	**October 1, 2000**	**Page 1 of 7**
Revision: 2	**Identification Number: EMS – 4. 4. 7**	
Title:	**Emergency Preparedness & Disaster Recovery Procedure**	
Prepared By:	**EMS Procedures Subcommittee**	
Reviewed By:	**EMS Management Steering Committee**	
Approved By:	**William E. Koopman Jr., General Manager**	
	John Cook PE, Assistant General Manager	
Date Approved:	**August 25, 2000**	

0.0 Requirement: ISO 14001, Sub Clause 4.4.7 Emergency Preparedness/Response

1.0 Purpose

To minimize disaster impacts and return CPW back into operation in a safe, quick, cost effective and environmentally sensitive way.

2.0 Scope

ISO 14001, sub clause 4.4.7, applies to the need to identify, prevent, and respond to emergencies and the period of time following the emergency event.

3.0 Responsibility & Authority

    3.1 Executive management is responsible for ensuring that an emergency preparedness program is implemented and for approving the emergency preparedness plans.

    3.2 Section heads and department heads are responsible for plan development, plan implementation and emergency preparedness team selection.

    3.3 Emergency Preparedness Team(s) (response/disaster recovery) are responsible for dealing with immediate threats to associates, the public and the environment and assisting in returning CPW back to functional operation

4.0 Procedure

4.1 Up-front Activities

4.1.1 The department head/section head will initiate the process to prepare a disaster response/recovery plan. The department head will assemble the Emergency Response/Disaster Recovery Team(s).

After review and approval of the plan(s), the team(s) will test the plan as conditions allow and, communicate the plan to associates and document. At least annually, or in the event of a disaster, review the plan and recommend plan modifications as necessary.

4.1.2 Duties of the Department Head/Facility Manager
The duties of the department or facility manager include the following aspects:

a) Identify potential risks to facilities and processes;

b) Identify and implement Best Management Practices (BMP's) where necessary (i.e., Process Safety Management, Risk Management, Hurricane Preparedness, etc.);

c) Establish incident reporting procedures;

d) Maintain, testing and inspection equipment according to specified frequency and procedures;

e) Establish emergency preparedness training for facility personnel;

f) Review new and significantly modified equipment or processes for modification of emergency response plans as necessary;

g) Manage emergency response change to new or modified equipment or processes;

h) Review at least annually, facility procedures for release prevention and emergency response;

i) Review and update hazard assessments at least every five years or as a result of changes;

j) Audit compliance of prevention programs at least every three years as required by the EPA Risk Management Plan and OSHA's Process Safety Management Standard.

4.1.3 Identification/Impact Assessment of Facility Resources
The department head or facility manager will inventory critical operations and available resources to identify and assess potential risk in the event the facility is destroyed in part or in total. This inventory should identify what critical items may need to be quickly replaced. The inventory should include, a description of required personnel skills, necessary chemicals or equipment, and identification of vendor sources.

4.1.4 Impact Minimization Strategies
An impact minimization strategy will be prepared for the identified resources that are critical and have a high likelihood of being impacted or destroyed. For example, this may include special training, backup files, backup communications or operations at other locations, additional containment around some chemicals and wastes, temporary containment (sandbagging) around critical equipment, bracing, and fire suppression equipment.

4.1.5 Phone Numbers and Contacts
There should be documented emergency numbers in both the emergency plan and disaster recovery plan. As a minimum the following should be included:
   a) department head, section head, or facility manager
   b) relevant civil defense contacts, (fire, police, toxic release contacts, FEMA, etc)
   c) executive management
   d) safety manager

4.1.6 Routine Inspections
The department's status, resources and supplies in terms of disaster recovery should be inspected frequently. As resources or facilities change, preparedness and recovery plans should be updated.

4.1.7 Off-site Disaster Headquarters
The affected department head, with input from the section head and/or executive management, will establish a working headquarters and necessary communication links.

4.1.8　Production and environmental control equipment will be appropriately maintained with preventive maintenance controls.

4.1.9　Critical Data
Regulatory records, account data, etc. should be backed up and stored in a protected environment. Software systems, such as, Supervisory Control and Data Acquisition (SCADA) essential to production will be backed up with the ability to function at other locations. Paper type files, which are critical to the operation should be copied and filed at a backup location or stored electronically or on microfiche, in a fire-resistant location.

4.1.10　Supplies
Some supplies should be purchased before a disaster, for the health and safety of the associates. Supplies should include such items as food, water, bedding, flashlights, tools, first aid kits, etc. for at least a three-day period.

4.1.11　Environmental Protection Supplies
Environmental protection supplies, such as spill cleanup materials, personal protection equipment, over-pack drums, etc. and materials required in regulatory plans such as the Risk Management Plan (RMP) will be maintained.

4.1.12　Emergency Plan Training and Distribution
It is important to prepare and distribute emergency plans to essential associates before a disaster occurs. Training on emergency response and disaster recovery will be given and documented to team members and associates involved in work that may cause significant environmental impact.

4.2　Disaster Control

4.2.1　During and Immediately Following a Disaster
After the immediate crisis is under control, the following activities should occur. These steps are considered as recovery actions.

4.2.2　Convene the Emergency Response Team/Disaster Recovery Team

Effective Date: **October 1, 2000**   **Page 5 of 7**
Revision: 2   **Identification Number: EMS – 4. 4. 7**
Title: **Emergency Preparedness and Disaster Recovery Procedure**

The ERT/Disaster Recovery Team will transition into a disaster recovery team (DRT). Additional members will/may be added at this time and include management, operations, safety, purchasing and finance members.

4.2.3   Area Inspections
The DRT will do an initial audit for safety hazards and, if any are found, notify associates to stay out of the affected area until corrected. Additional inspections would be made to assess facility or equipment operability and preliminary cost estimates on financial damage.

4.2.4   Associate Needs
After assessing immediate safety needs, longer-term needs should be considered. This may include information to families or help in locating families. This may include additional supplies such as food, water, blankets, and temporary shelter for associates, etc.

4.2.5   Insurance Companies/Relief Agencies
Proper insurance representatives/federal agencies should be called to schedule site visits as soon as possible.

4.2.6   Human Resource Skills Bank
Associates who are able to report to work should report to an identified individual or location so that recovery needs can be matched with associate skills and assigned appropriate recovery tasks.

4.2.7   Reestablish Process Control and Utilities
During the disaster some utilities may have shut down by accident or design. The DRT will work with the water and wastewater departments and with the gas and electric companies to restore service.

4.2.8   Reestablish Communications
CPW personnel will need to be directed during communication outages. Telephone company personnel may be needed to reestablish critical phone lines. It may be necessary to use cellular phones and radios for initial communications. Once communications are reestablished, a call-center should be set up to respond to associate and public questions and concerns.

4.2.9   Facility Repairs
Start work in restoring damaged facilities, based upon critical need.

4.2.10 Reassess and verify that chemical and waste systems are working and not causing adverse environmental impacts. If a potential problem is noted, it should be checked out, and if necessary, immediately corrected.

4.2.11 Reestablish SCADA and Computer Systems
Some operations are totally dependent upon computer systems. These must be repaired or relocated as quickly as possible. Computer systems that support customer services should be reestablished as quickly as possible.

4.2.12 Replacement of Critical Files
Any essential files that may have been destroyed should be re-created by off-site or back-up files. This is especially important concerning certain customer or associate personnel files.

4.2.13 Reestablish Financial and Human Resources System
It may be necessary to shift certain financial and HR systems, such as compensation and benefit administration to another site for a period of time.

4.2.14 Media
Contacts from, or to the media, should be directed by CPW executive management or an authorized designee.

4.3 Post Incident Investigation

4.3.1 In the event of an emergency situation or accident that has significantly impacted the environment or which has the potential to do the same, a post incident investigation will be conducted. An emergency situation or accident requiring a post incident review is one in which there is the potential to be a major violation of a regulatory permit, a major impact to public health or services, or a major impact to the environment. The need for a post incident investigation shall be determined by executive management or the appropriate department head and a post incident review team shall be assembled accordingly to conduct the investigation. Such post incident investigations shall evaluate the cause(s) of the incident and identify factors which should be evaluated for preventing or mitigating the impacts of future incidents, including revising its emergency preparedness and response procedures and documenting the results.

4.3.2 Corrective Action Plan
The affected department shall prepare a corrective action plan (if necessary) and submit the plan and subsequent plan amendments to the Post Incident Review Team for review and approval. The EMS program manager (or designee) shall track the activities of the corrective action plan and perform verification surveillance(s) upon completion of corrective action plan activities and submit recommendation(s) for closure to the Post Incident Review Team.

4.4 Related Documents and Data

4.4.1 Emergency Response Plans
4.4.1 Inventory of Damaged Facilities
4.4.2 Spill Report Records.
4.4.3 Injury Report Records
4.4.4 Emergency Response and Disaster Recovery Team records
4.4.5 FEMA, Damage Survey Report Forms
4.4.6 Post Incident Review Report
4.4.7 Corrective Action Plan

DD-SEOP 4.4.7

EMERGENCY PREPAREDNESS AND RESPONSE

1.0   PURPOSE AND SCOPE

This document defines the procedures to establish and maintain plans and to identify the potential for, and responses to, incidents and emergency situations on employees, public and the environment and for preventing and mitigating the likely illness, injury and environmental impacts that may be associated with them.

This procedure and associated operational controls address or consider impacts and degree of risks associated with environmental aspects, issues related to illness and injury, and corrective actions associated with the following:

- accidental discharges to water and land
- accidental emissions to the atmosphere
- specific environmental and/or ecosystem effects associated with accidental releases
- unsafe work practices and/or conditions

The procedure also specifies the process utilized by the company to periodically review emergency preparedness and response procedures in light of operational changes, and following the occurrence of an unexpected incident or event.

2.0   DEFINITIONS

3.0   RESPONSIBILITIES

4.0   PROCEDURE

4.1   Identification of Emergency Situation

4.1.1   The General Water Utility Supervisor, Standby and Duty Supervisors, and EMR (as appropriate) shall be responsible to identify potential emergency response situations where environmental impacts may result.

4.1.2   The identification of potential emergency situations shall be reviewed once a year during the emergency drills or when a new response and containment activity is being introduced.

4.1.3   The emergency situations shall be updated in the above mentioned applicable documents.

4.2   Emergency Response Procedures

4.2.1   Procedures covered by this DD-SEOP are described in detail in the WWC Divisions Sewer Overflow Response and Tracking Plan (SORTP). This document contains sewer overflow response and notification procedures for use at the operations level in

specifically responding to emergency events. Additionally, the document is intended for use by Division management in determining the types and levels of resources necessary to respond to and mitigate emergency situations. The SORTP and relevant attachments is therefore incorporated by reference into this DD-SEOP.

4.2.2 The referenced documents provide the following information for adaptation into this procedure:

- Regulatory Requirements
- Receiving Information Regarding Sewer Overflows
- Dispatching Crews to Sewer Spill Sites
- Definitions of incidents and responder requirements
- Emergency management structure and organization-spill event notification listing
- Emergency procedures are provided for each of the categories of operational scenarios identified
- Post-emergency response notification and reporting procedures and investigation follow up
- Sanitary Sewer Overflow Tracking Database

4.2.3 The above mentioned applicable documents shall be make available either by hard copies or soft copies to the following:

- Section Manager
- Duty Supervisor
- Central Operations Management Center (COMC)
- Sewer Alarm Monitoring Section (SAMS)
- City of San Diego Dispatch Center (Station 38)

4.3 Emergency Training

4.3.1 Awareness training of the emergency response and spill notification procedures shall be provided to all new employees during the orientation briefing conducted by the Section Manager and I&OS department.

4.3.2 Appropriate WWC staff shall be trained in their roles during an emergency situation. Practical exercise (where appropriate) shall be conducted to familiarize with their roles. The I&OS Division and respective WWC Section Managers shall coordinate training of the ERT members.

4.4 Emergency drills and situations

4.4.1 Emergency drills involving hazardous materials usage should be carried out according to a pre-determined schedule. The I&OS Division together with the ERT shall schedule such drills involving partial or all the operations at each location.

4.4.2 The EMR and ERT Rep shall discuss the results of the emergency drills or cause of the emergency situations and minutes of the meeting shall be maintained.

4.4.3   The I&OS Department and WWC ERT Rep shall meet to discuss the occurrence of an emergency situation. An investigation shall be compiled for an occurrence of an emergency situation to be submitted to the authority or/and management.

4.4.4   The above mentioned applicable documents shall be reviewed and revised according after each emergency drills or occurrence of emergency situation.

4.5   Mitigating Environmental Impacts.

4.5.1   Relevant Emergency Plan procedures have been established to handle emergency situations.

4.5.2   Fire fighting equipment and spill kits are made available to handle fire and spill emergency situations respectively. First aid supplies are also made available in the event of emergency situations. Procedures have been established for maintenance of fire fighting equipment.

4.5.3   If there is an emergency and after bringing under control, employees will be able to go back to their workplace to inspect for any damages upon clearance and instruction from ERT Coordinator(s).

4.5.4   Appropriate Section Managers shall arrange for contractors to clear the debris and to clean up the area. All debris shall be disposed appropriately according to legislated requirements.

4.5.5   Appropriate Section Managers shall decide whether to form an inquiry committee to investigate into causes and recommend remedial actions to prevent future occurrence.

5.0   REFERENCES

MWWD Departmental Health and Safety Manual

MWWD Major Incident Response Plan

City of San Diego Emergency Operations Plan

City of San Diego Employee Emergency Handbook

City of San Diego Hazardous Waste Management Guide

WWC Sewer Overflow Response and Tracking Plan

Section-specific emergency contingency response plans

SAMPLE EMS DOCUMENTATION

MONITORING AND MEASUREMENT

Charleston CPW – Monitoring and Measuring Key EMS Characteristics Procedure
City of Gastonia WWTP – Monitoring and Measuring Procedure
City of Eugene WWTP – Monitoring and Measurement Procedure
City of San Diego WWC – Calibration of Environmental Measurement and Test Equipment

CPW ENVIRONMENTAL MANAGEMENT SYSTEM PROCEDURE

The on-line version and secured hardcopy are the controlled documents. The secured hardcopy will be identified by an "Official Document" stamp giving date of distribution. Any and all other documents are uncontrolled. Contact EMS Program Manager for revision level status.

Effective Date:	**October 1, 2000**	**Page 1 of 2**
Revision: 0	**Identification Number: EMS – 4.5.1 (A)**	
Title:	**Monitoring and Measuring Key EMS Characteristics**	
Prepared By:	**EMS Procedures Subcommittee**	
Reviewed By:	**EMS Management Steering Committee**	
Approved By:	**William E. Koopman, Jr., General Manager**	
	John Cook PE, Assistant General Manager	
Date Approved;	**August 25, 2000**	

0.0 Requirement   ISO 14001 1996-E, Sub Clause 4.5.1 Monitoring and Measuring

1.0 Purpose

This procedure describes the process for the scheduled monitoring and measurement of key characteristics of the organization's environmental management system activities.

2.0 Scope

This procedure addresses collection of environmental data associated with operations and activities that have the potential to have a significant environmental impact.

3.0 Responsibility and Authority

3.1 The department head is responsible for submitting a monthly operating report (MOR) which describes the key characteristics of the EMS and the status of the objectives and targets and associated improvement programs.

3.2 The department supervisor(s) are responsible for generating environmental monitoring and measurement data to be submitted in the Monthly Operating Report (MOR).

3.3 Executive management shall review the monthly operating reports to assure continuing suitability and effectiveness of the EMS.

4.0 DEFINITIONS AND ACRONYMS

EMS   Environmental Management System

Environmental Key Characteristics - an element of an operation or activity that includes a measurement or an inspection process the results of which supports evaluation of environmental performance of objectives and targets.

Monitoring - a systematic process of watching, checking, observing, inspecting, keeping track of, regulating or otherwise controlling key parameters and characteristics of a department's management activities to determine conformance with a specific standard or other performance requirement, or to measure progress toward its environmental objectives and targets.

Measurement - a systematic method for estimating, testing, or otherwise evaluating key parameters and characteristics of a department's management activities to determine conformance with a specific standard, other performance requirement.

5.0 Procedure

5.0.1   Monthly Operating Report (MOR)

A monthly report shall be established for department heads/supervisors to submit monitoring and measuring information to support performance of the EMS. The report is to be structured as a minimum to:
- Provide status of environmental management programs designed to fulfill environmental objectives and targets,
- Provide status of performance indicators as related to targeted timeframes,
- Provide compliance status of environmental operating permits issued by environmental regulatory agencies.

5.0.2 Performance Tracking

Environmental data collected to reflect environmental performance is to be maintained in such a manner to allow the evaluation of progress toward realizing environmental objectives and targets.

6.0   Related Documents

Environmental Aspects,
Objectives, Targets, and Improvement Programs
Legal and Other Requirements
Operating Permits

7.0   RECORDS

Monthly Operating Report

Standard Operating Instruction – EMS-0100.013 Name: Monitoring and Measuring	**Corresponding Requirements:** ISO Standard: 4.5.1 NBP Element: 13 EMS Manual: 4.5.1
Prepared By: Beth Eckert, EMS Coordinator	Revision Date: 8/11/03 Revision #: 6
Approved By: Beth Eckert, EMS Coordinator Signature:	Effective Date: 8/1/00 Page 1 of 3

EMS Monitoring and Measuring
Standard Operating Procedure

1.0 Purpose

1.1 The following procedure provides guidance for preparing quarterly reports which will be reviewed during quarterly Management Review Board meetings in order to monitor and measure the Division's significant impacts on the environment, biosolids program performance at critical control points, compliance, progress on objectives and targets, and results of compliance and EMS audits. During the Management Review Board meeting the Division Manager WWT and Director of Public Works and Utilities shall use all provided information to ensure the continuing suitability, adequacy and effectiveness of the EMS.

2.0 Associated Equipment

2.1 None

3.0 Associated Reference Material

3.1 Data Trend data base

3.2 Spill reports

3.3 Incident Reports

3.4 Division utility bills

3.5 Compliance Audits

3.6 Summary of Activities and NPDES Permit Limit/SOC Violations (EMS-0101.009)

3.7 SIU notices of violations

3.8 Hazardous waste manifests

3.9 Biosolids bills

3.10 Laboratory data

3.11 External communications logs

3.12 EMS Audits

3.13 Training matrix (EMS-0101.002B)

3.14 Corrective and Preventative Action reports (EMS-0101.004) (reviewed at C/PAR meetings by MRB which are held at least bi-monthly)

3.15 Monitoring and Measuring Forms (as MRB Reports on the Read-only drive)

- EMS-0101.013A   EMS Status Report
- EMS-0101.013B   Long Creek Operations
- EMS-0101.013C   Crowders Creek Operations
- EMS-0101.013D   Long Creek Laboratory
- EMS-0101.013E   Crowders Creek Laboratory
- EMS-0101.013F   Biosolids
- EMS-0101.013G   Pretreatment
- EMS-0101.013H   Facility Maintenance

4.0 Procedure

4.1 During each management review board meeting, data will be presented to track the performance of the environmental management system.

4.1.1 At a minimum this review will track the division's performance regarding the significant environmental impacts in each area, biosolids program performance at each critical control point, compliance, objectives and targets, compliance audits, EMS audits, operational controls, and the suitability, effectiveness, and adequacy of the EMS.

4.2 Each area supervisor or designated personnel shall complete the appropriate monitoring and measuring forms (EMS-0101.013_), by utilizing necessary resources as identified above.

4.3 All forms shall be submitted to the EMS coordinator or other designated personnel via e-mail prior to the management review board meeting. The EMS coordinator or designated personnel shall compile all data provided into a single report to be provided at the management review board meeting.

4.3.1 The quarterly report shall be provided to members of the MRB at least 5 days prior to the meeting to ensure that each member has sufficient time to review the information.

4.4 Supervisors will be responsible for providing an oral presentation regarding the status in their area. The EMS Coordinator or designated personnel shall be responsible for reporting on the status of EMS activities.

4.4.1 The EMS Coordinator or designated back-up shall issue periodic updates via e-mail, memo, or bulletin board regarding updates to EMS level documentation, EMS training, and status of EMS audits.

4.5 The EMS Coordinator or designated personnel shall document the MRB meeting with meeting minutes. The minutes of this meeting shall be filed along with a copy of the Quarterly report in the EMS Coordinators files and maintained on the U: drive.

4.5.1 The EMS Coordinator will create C/PARs for any actions, which are requested during the MRB meeting to ensure follow-up.

5.0   Revision History:

Revision		C/PAR #	Reason for Revision	Description of Revision
Date	#			
5/20/02	3	EMS-0074	External Auditor	Removal of Deviations statement from Level II procedures
5/20/02	3	EMS-0084	C/PAR	Added a modification history section
10/14/02	4	EMS-0116	C/PAR-NBP	Added NBP requirements and element number
10/14/02	4	EMS-0119	External auditor – C/PAR	Include a time frame to have the MRB report to members to ensure enough time to properly review the document
1/21/03	5	29	MRB	Requires EMS Coordinator of designee to issue EMS updates monthly to include audit status. Allowed for less restrictive time frame on C/PAR meetings to at least bi-monthly instead of monthly.
8/11/03	6	171	CPAR	Changed EMS Update to periodically instead of monthly. Added Facility Maintenance Monitoring & Measuring Form

CITY OF EUGENE – WASTEWATER DIVISION
Procedure

Subject:	Monitoring and Measuring			Document No:	WW-00015
Last Reviewed By:	Management Team	Original Date:	8/8/00	Revision No:	2
Approved By:	Management Team			Date Approved:	7/17/03

Purpose

The purpose of this procedure is to outline how the Division will ensure appropriate methods are in place to monitor and measure performance against the environmental objectives and targets of the management system.

Scope

This procedure covers methods to ensure the reliability of data, calibration of relevant equipment and instruments, and compliance with the management system.

Definitions

- QA/QC
- EMS Program Coordinator

Safety Requirements

All specific safety requirements will be included or referred to in specific work instructions.

Procedure (Include reporting requirements and precautionary steps in this section)

Accountablity:	Responsibility:
Management Team Supervisors	Track performance of environmental monitoring and measurement activities that are applicable to the Division's management system.
EMS Team Management Team	Identify appropriate environmental performance indicators for the Division that are relevant to the Division's activities, consistent with our environmental policy, practical, cost effective and technologically feasible.
EMS Manager	Develop process to periodically evaluate compliance with relevant environmental and legislative regulations. Analyze results of measuring and monitoring systems to determine areas of success and to identify activities requiring corrective action and improvements.
Laboratory Supervisor Environmental Data Analyst	Review Quality Assurance Plan annually.

Supervisors	Ensure that relevant work section QA/QC procedures are consistent with the approved QA/QC plan.
	Develop and maintain appropriate processes and instructions to ensure reliability and documentation of data such as calibration of instruments, test equipment and software or hardware sampling.
EMS Program Coordinator	Develop and maintain work instructions for relevant monitoring and measurement activities to document performance related to the Division's environmental objectives and targets.
Division Staff	Inform supervisors of any activities or irregularities that may have an impact on monitoring or measuring requirements related to the environmental management system.
	Perform calibration of instrumentation and test equipment, confirms hardware and software sampling is functional.
	Assist in the development of work instructions for monitoring and measurement activities.

Perform monitoring and measurement activities such as :

- Measure mercury level in influent
- Measure paper goods purchased
- Measure vehicle fuel usage and mileage
- Monitor purchased paper goods for recycle content
- Measure annual power consumption
- Monitor quantities of non-recyclable waste

Environmental Data Analyst	Review and interpret environmental data.

References

Quality Assurance Plan

DD-SEOP 4.5.1

CALIBRATION OF ENVIRONMENTAL MEASUREMENT AND TEST EQUIPMENT

1.0   PURPOSE AND SCOPE

This procedure applies to the major sections that comprise the Wastewater Collections (WWC) Division of the City of San Diego's Metropolitan Wastewater Department (MWWD).   It describes a controlled process for calibrating and maintaining those environmental measurement and test equipment (EM&TE) items that are used specifically for the gathering of data to directly support monitoring and measurement requirements that are invoked as permit conditions or as other legal or regulatory requirements, or that support MWWD initiatives related to beneficial use of waste byproducts.   In addition, processes for monitoring and calibration of equipment used in support of EMS performance measurement are covered by this procedure. This procedure does not apply to measurement or test devices used for other routine operational or process monitoring or measurement purposes.

Calibration and maintenance of EM&TE is required so that the accuracy and precision of the environmental data collected (and potentially, the calculations based on the data) are known and defensible.

2.0   DEFINITIONS

2.1   Calibration

Calibration is defined as the periodic comparison of an instrument or measurement device to a standard of known and greater accuracy, in order to assure the continuity and accuracy of measurements or data.   If no calibration standards meeting the definition in Section 2.2 exist, then the basis or justification of calibration methods must be separately documented as noted in Section 4.

2.2   Calibration Standard

A calibration standard is defined as a device or reference used as a means of comparison for quantitatively determining the accuracy, precision, and repeatability of instruments or measurement devices.   Calibration standards must have a known and traceable relationship to nationally recognized standards such as those maintained by the National Institute of Standards and Technology (NIST).

3.0   RESPONSIBILITIES

3.1   Section Electrical Support

Staff assigned to major WWC Division operations have primary responsibility for the development of section-specific EM&TE calibration/maintenance requirements matrices, and for implementation of the calibration and maintenance program requirements defined by this procedure.

3.2   Environmental Management Representative (EMR)

The EMR is responsible for monitoring the development of section-specific EM&TE calibration/maintenance requirements matrices, and for providing technical assistance to individual Section Managers where necessary.

3.3   Section Managers

Section Managers or their designees are responsible for review and approving applicable section-specific EM&TE calibration/ maintenance requirements and for ensuring that appropriate resources are made available to ensure that calibration and maintenance are performed within their established intervals.

4.0   PROCEDURE

The procedure consists of the following steps:

4.1   Individual Section Managers shall, with the assistance of the EMR, and the Operations and Inspection Section prepare a section-specific inventory of EM&TE for which calibration and maintenance under this procedure is required.

4.2   For each equipment item so identified, calibration and maintenance requirements (i.e., establishment of equipment identifier, calibration/maintenance interval, calibration/maintenance procedure or process, and source of calibration or maintenance, if performed externally) shall be developed and documented in the WWC Division's Computerized Maintenance Management System (CMMS). Requirements are described further in the following paragraphs.

4.3   Unique numerical identifiers shall be assigned to all EM&TE items. All EM&TE with expired calibration or maintenance due dates shall, where practicable, be tagged with an "Out of Service" tag pending calibration, maintenance, or withdrawal from the EM&TE inventory.

4.4   The required calibration and/or maintenance intervals shall be established, based on the manufacturer's recommendations, the level of projected use, the usage environment, and usage history. Maintenance intervals may be less than or equivalent to, but not greater than, calibration intervals.

4.5   The recall date shall represent the date by which the EM&TE items must be withdrawn from service for calibration and/or routine maintenance.

4.6   Specific calibration and maintenance instructions shall be provided, based, upon the EM&TE manufacturer's recommendations. Calibration standards to be used should be identified; if no calibration standards exist, then the basis or justification of the calibration methods must be separately documented

        Any limitations on use shall be specifically defined.

4.7   The completed EM&TE Calibration Measurement Requirements shall be presented to the Section Manager or their designee for review and approval; all comments shall be resolved to the reviewer's satisfaction.

4.8   The Section Manager shall coordinate the calibration and/or maintenance of all EM&TE identified with Electrical Support and Planner/Scheduler staff. Where practicable, a calibration tag shall be physically attached to the device indicating calibration recall date and the equipment asset number. Calibration may be performed under the direction of the section manager, either internally or externally (by qualified calibration service subcontractors). Regardless of whether the calibration is performed internally or externally by a subcontractor, all reference standards shall be traceable to nationally recognized standards. If no standards exist, written justification of the calibration method shall be documented in the "step description" column of the CMMS procedures.

4.9   The EM&TE Calibration Measurement Reports shall be used by the Section Managers to track ongoing EM&TE calibration/maintenance status. A record copy shall be forwarded to the EMR, when requested, for information and retention in the environmental records in compliance with Section 5.3 of the EMP.

4.10   The Electrical Support staff shall notify Section Managers in advance of any calibration and maintenance activity to allow for the planning of any required system downtime or instrument changes. Environmental Coordinators may initiate internal Corrective Action Requests (CPAR see DD-SEOP 4.5.2, "Non-Conformance and Corrective and Preventive Action") or purchase orders as appropriate to control specific equipment recall, calibration, and maintenance activities.

        Failure to complete schedule calibration or maintenance within the interval defined on the section's EM&TE Calibration Measurement Requirements Procedures shall be considered to be a nonconformance, subject to the corrective and preventive action processes defined by DD- SEOP 4.5.2, "Non-Conformance Corrective and Preventive Action."

5.0   REFERENCES

WWC Division Environmental Management Plan
        Section 4.6.1, Environmental Action Requests
        Section 5.1, Monitoring and Measurement
        Section 5.2, Control of Non-conformance's and Corrective and Preventive Action
        Section 5.3, Records

DD-SEOP 4.5.2, Nonconformance and Corrective and Preventive Action

TABLE 1 (DD-SEOP 4.5.1)

ENVIRONMENTAL MEASUREMENT AND TEST EQUIPMENT CALIBRATION AND MEASUREMENT MATRIX

Section: _____

Approved By: _____

Approval Date: _____

Equipment Name	Control No.	In Service Y/N	Calibration Interval	Maintenance Interval	Recall Date	Calibr/Maint. Date	Limitation on Use	Calibr/Maint. Instructions

* may not be greater than calibration interval

Form # DD-F-012.0
Form Rev. Date: 6/02

SAMPLE EMS DOCUMENTATION

EMS INTERNAL AUDIT

City of Eugene WWTP – Internal EMS Audit Procedure
City of San Diego WWC – Internal EMS Audit and Compliance Verification Procedure

CITY OF EUGENE – WASTEWATER DIVISION
Procedure

Subject:	Compliance Audit			Document No:	WW-00465N
Last Reviewed By:	Management Team	**Date Prepared:**	8/8/01	**Revision Date:**	8/8/01
Approved By:	Management Team	**Date Approved:**	8/17/01	**Next Review Date:**	2/1/05

Purpose

This procedure describes the process used by the Division to schedule and complete regulatory compliance audits.

Scope

Procedure applies to all Division facilities and activities. Compliance audits will evaluate the Division's compliance with relevant environmental legislation and regulations.

Definitions

▪ [Audit](#)

Safety Requirements

All specific safety requirements will be included in specific work instructions.

Procedure (Include reporting requirements and precautionary steps in this section)

Accountablity:	**Responsibility:**
EMS Manager	Schedule compliance audit. An external consultant will perform audits every five years at a minimum.
	Manage process to identify external consultant to perform compliance audit in accordance with City purchasing procedures.
	Manage contract with external consultant.
Management Team	Review compliance audit report. Initiate any necessary corrective action in accordance with Non-Conformance and Corrective Action Procedure.

References

Non-Conformance and Corrective Action Procedure

DD-SEOP 4.5.4

**ENVIRONMENTAL MANAGEMENT SYSTEM AUDITS
AND COMPLIANCE VERIFICATION**

1.0   PURPOSE AND SCOPE

This procedure establishes minimum requirements for planning, performing, and documenting periodic internal audits of the ISO 14001-based environmental management system (EMS) established for the City of San Diego's Metropolitan Wastewater Department (MWWD), Wastewater Collections (WWC) Division.

2.0   DEFINITIONS

2.1   EMS Audit

An EMS audit is defined as a planned and documented investigation performed in accordance with written procedures or checklists for the purpose of verifying, by examination and evaluation of objective evidence, that applicable elements of an ISO 14001-based EMS have been developed, documented, and effectively implemented in accordance with specified requirements.

2.2   Lead EMS Auditor

A Lead EMS Auditor is a qualified and trained individual who is authorized to plan, organize, and direct EMS Audits of WWC Division section and activities; to report findings and observations; and to evaluate the adequacy of corrective and preventive action. At a minimum, WWC Division Lead EMS Auditors shall have received ISO 14001 internal EMS Auditor training and have participated in an internal audit, as an auditor.

2.3   EMS Auditor

An EMS Auditor is defined as a qualified and trained individual who is authorized to perform specific EMS Audit functions under the direction of a Lead EMS Auditor. At a minimum, each auditor must attend a documented training session conducted by the Lead EMS Auditor that presents the detailed requirements of this procedure and discusses their roles in the planned audit.

2.4   EMS Audit Observer

An EMS Audit Observer is an EMS audit team member assigned to observe audit activities under the direction of the Lead EMS Auditor. At the Lead EMS Auditor's discretion, technical observers may be requested to perform specific audit functions in relation to their area of expertise. At a minimum, each observer must attend a documented training session conducted by the Lead Auditor that presents the detailed requirements of this procedure and discusses their roles in the planned audit.

2.5   Finding

A finding is defined as a deficiency or lack of compliance with any element of an EMS. All findings must be formally resolved to assure effective correction of the observed condition and the adoption of system improvements or preventive measures to reduce or preclude the likelihood of recurrence.

3.0   RESPONSIBILITIES

3.1   Environmental Management Representative

The Environmental Management Representative (EMR) is responsible for establishing audit schedules and for designation or selection of Lead EMS Auditors who are independent of the day-to-day management of the plant functions to be audited. The EMR shall also review and approve EMS audit plans and reports.

3.2   Lead EMS Auditor

The Lead EMS Auditor is responsible to the EMR for the organization, planning, and direction of EMS audits, as well as the selection, training, and supervision of the audit team. The Lead EMS Auditor prepares audit plans and reports, and is responsible for evaluating and recommending any required corrective and preventive action responses resulting from audit findings.

3.3   EMS Auditors or Observers

Auditors are responsible for assisting in audit preparation, conducting audit investigations, and reporting results in compliance with this procedure, under the direction of the Lead EMS Auditor. When requested, audit observers shall assist in audit preparation and in conducting audit activities in areas in which they have specific expertise.

3.4   Section Managers

Section Managers of audited section or group shall provide time, work space, and personnel as necessary to support the performance of EMS audits, and are responsible for supervising the prompt and effective resolution of any audit findings.

4.0   PROCEDURE

The audit process is described in the following steps, and is summarized in the flowchart presented in Figure 1:

4.1   Audit Scheduling: EMS Audits shall be conducted at least annually. Audit frequency may be increased at the discretion of the EMR or when specifically requested by upper management.

4.2   Audit Notification: The Lead EMS Auditor shall notify the managers or section heads of the audited organization at least ten days prior to the projected audit date. The

notification shall set the date, time, location, and method of the opening meeting, and shall request that appropriate section personnel participate. Audit notification, opening and closing meeting requirements may be met via e-mail communication.

4.3   Audit Plan: The Lead EMS Auditor shall prepare an audit plan. At a minimum, the audit plan shall include the following:

- the audit number (consecutive, by calendar year);
- a statement of the audit objectives; an identification of the specific section areas being audited;
- a discussion of any special emphasis or focus; references to appropriate plans, procedures, or requirements documents;
- the date(s) of the audit; and an identification of the audit team and the members' assigned roles.

Records of previous audits and corrective and preventive action requests for the audited organization shall be reviewed prior to preparation of the audit plan. Identification of trends or repeated problems identified during the review shall be reflected in the scope of the audit, as appropriate. Any areas of special emphasis shall also be noted in the audit plan.

Audit team selection shall be based on consideration of the particular areas of emphasis for the audit and the qualifications and capabilities of the prospective team members. Audit team members should be sufficiently independent of the day-to-day management of the audit areas that they are responsible for so that the potential for a conflict of interest is minimized. Completed audit plans shall be submitted to the EMR and affected section managers for review and comment prior to the audit.

4.4   Audit Checklist Preparation: The Lead EMS Auditor shall prepare or direct the preparation of an audit checklist based on the elements of the ISO 14001 standard. EMS auditors or observers may be assigned the preparation of specific checklist sections, especially in areas for which they will assume auditing responsibilities. Checklist content shall be consistent with the scope of the audit presented in the Audit Plan. Copies of the checklist, the audit plan, and any required reference specifications, procedures, or plans shall be distributed to the audit team prior to the audit. The Lead EMS Auditor shall brief the audit team on the general scope of the audit and the details of the audit plan, and shall discuss audit checklist assignments prior to the pre-audit opening meeting.

4.5   Opening Meeting: The pre-audit opening meeting shall be conducted by the Lead EMS Auditor, and shall be attended by the audit team members and appropriate representatives of the audited section. Participation shall be documented. The scope of the audit and duties of the auditors or any technical observers shall be briefly presented. Questions from the audited organization shall be answered, proper lines of communication established, and a time set for the closeout meeting. These requirements may be met via e-mail communications.

4.6   Conducting the Audit: Each auditor shall proceed with the investigations required by their assigned portion of the checklist. General guidance on auditing methods is provided in Attachment 1 of this procedure. Auditing methods may include records review, interviews with individual WWC Division staff members, and/or direct observation of plant activities.

The audit team shall meet and report on audit progress as directed by the Lead EMS Auditor. Observed conditions that require immediate corrective action shall be promptly reported to the management of the audited group or organization. Demands on resources and time may not be increased beyond the level presented in the opening meeting without first discussing and obtaining approval of such requests from the affected section manager.

When the checklist items have been completed, the audit team shall meet and present their potential findings to the Lead EMS Auditor. The Lead EMS Auditor shall review the auditors' input, obtain additional clarification where required, and prepare or direct the preparation of a draft list of potential findings.

4.7   Closing Meeting: A draft list of potential findings and observations shall be presented to representatives of the audited organization in a brief post-audit closing meeting. Participation shall be documented.   Discussion shall generally be limited to the presentation of findings and the clarification of any misunderstandings. These requirements may be met via E-Mail communications.

4.8   Audit Report Preparation: After the post-audit meeting, the auditors shall prepare final copies of their completed checklist sections and submit them to the Lead EMS Auditor. The Lead EMS Auditor shall prepare a formal audit report, which shall include the following items: a brief description of the audit scope; the identification of the audit team and key personnel contacted from the audited organization; a general statement summarizing the effectiveness of the EMS; and a brief discussion of any findings.

Each finding shall also be recorded on a Corrective/Preventive Action Request (C/PAR) form in compliance with the requirements of DD-SEOP 4.5.2, Non-Conformance and Corrective and Preventive Action   The audit report and any C/PAR forms shall be submitted to the management of the audited organization for appropriate action, with copies provided to the EMR and the Deputy Director, WWC Division.

4.9   Review of Corrective/Preventive Action Responses and Audit Closeout: The Lead EMS Auditor shall participate in the development of corrective and preventive actions as necessary to ensure that each finding or observation has been adequately addressed. When proposed corrective actions have been determined to be acceptable, the Lead EMS Auditor shall notify the EMR and the affected section managers that the audit is considered to be closed.

4.10   Audit Documentation: Once the audit has been closed, the Lead EMS Auditor shall forward a complete copy of the audit documentation to the environmental records in compliance with Section 5.3 of the WWC Division EMP. At a minimum, audit

documentation shall include copies of the audit notification memo, the audit plan, audit opening and closing meeting participation sheets, the completed audit questionnaire, the audit report, copies of any closed C/PAR forms, and an audit closeout memorandum.

4.11   External Audit/Compliance Verification

Audit Requirements

4.11.1 The Management Representative or assigned person is to administer the compliance audit activities. Notification must be sent to personnel in the WWC, and he/she shall hold a meeting with the External Auditor to clarify the purpose of the Audit, and areas or functions to be inspected.

4.11.2 The type of External Audits are listed as follows and is not exhaustive:

a.   ISO 14001 certification and surveillance audits.

b.   Internal City Initiated Audit.

c.   External Compliance Audit.

4.11.3 During the course of the audit, an area representative shall accompany the Auditor(s), and answer general questions about the section activities, processes and services.

4.11.4 During the audit and exit meeting, the WWC Division representative(s) should neither agree nor disagree to carry out any recommendations or requirements necessitating a capital appropriations request or budget approval process prior to implementation.

4.11.5 The Auditing parties will submit their findings in writing. Findings should be written in a factual manner that does not reflect conjecture, supposition or unwarranted conclusions.   Findings should be marked "Confidential," and forwarded to respective WWC Section Heads who will ensure that distribution is limited to only those persons with a specific need for the information. A copy of the report must be forwarded to the EMR.

4.11.6 After the site receives a written audit report from the auditor, and any clarification needed, the respective WWC Section Heads, EMR and other MWWD representatives will discuss the recommendations and requirements with affected site management. A corrective action plan, which addresses all findings, should be developed by responsible departments. The Corrective/Preventive Action Report (C/PAR) shall be raised as per DD-F-006.0 accordingly.

4.12   All External audit reports and corrective action plans shall be retained as required.

5.0   REFERENCES

WWC Division Environmental Management Plan
>   Section 5.2, Control of Non-conformances and Corrective and Preventive Action
>   Section 5.3, Records
>   Section 5.4, Environmental Management System Audit

DD-SEOP 4.5.2, Non-Conformance and Checking Corrective and Preventive Action

Figure 1

EMS Audit Process

```
                                    Lead EMS
    ┌──────────────────┐            Auditor
    │  Prepare audit   │──────────────────────────────────►┐
    │ notification memo│                                    │
    └──────────────────┘                                    │
              │                                             │
              ▼                                             │
    ┌──────────────────┐            Lead EMS               │
    │  Select and train│            Auditor                │
    │    audit team    │                                    │
    └──────────────────┘                                    │
              │                                             │
              ▼                                             │
 Lead EMS  ┌──────────┐   ┌──────────────────┐  Lead EMS   │
 Auditor   │ Resolve  │──►│ Prepare audit plan│  Auditor   │
           │ comments │   │   and checklist   │───────────►┤
           └──────────┘   └──────────────────┘             │
                ▲                   │                       │
                │                   ▼          EMR/Facility │
                │              ◇ EMR/Facility ◇  Sup's      │
                └──── No ──────◇ Sup. Accept? ◇             │
                               ◇             ◇              │
                                     │ Yes                  │
                                     ▼                      │
                            ┌──────────────┐  Lead EMS      │
                            │ Conduct audit│  Auditor/      │
                            │              │  Audit Team    │
                            └──────────────┘                │
                                     │                      │
                                     ▼                      │
                            ┌──────────────────┐ Lead EMS   │
                            │Prepare audit report│ Auditor   │
                            │ C/PARs as required │──────────►┤
                            └──────────────────┘             │
                                     │                       │
EMR/Facility ┌──────────┐  ┌─────────────────┐  EMR/Facility│
Sup's        │ Resolve  │─►│Prepare corrective/│  Sup's      │
             │ comments │  │ preventive action │────────────►┤
             └──────────┘  │responses as required│           │
                  ▲        └─────────────────┘               │
                  │                │          Lead EMS        │
                  │                ▼          Auditor  Yes    │
                  └──── No ──◇ Lead EMS Auditor ◇────────────►┤
                            ◇    Accept?       ◇              │
                                     │                        │
                              Lead EMS│                       │
                              Auditor ▼          EMR/Records Clerk
                    ┌──────────────────┐   ┌──────────────┐   │
                    │  Advise EMR and  │   │ File records │◄──┘
                    │Facility Superinten-│─►│  per EMP 5.3 │
                    │ dents of closure │   └──────────────┘
                    └──────────────────┘
```

C/PAR - Corrective/Preventive Action Request
EMP - (WWC Division) Environmental Management Plan
EMR - Environmental Management Representative
EMS - Environmental Management System

ATTACHMENT 1:

SUPPLEMENTARY GUIDANCE FOR CONDUCTING EMS AUDITS

1.0   GENERAL CONSIDERATIONS

This attachment provides general guidance that should be considered by the Lead EMS Auditor, individual auditors, and the audit team as a whole during the onsite portion of an EMS audit.

1.1   Audit Team Behavior

The overall demeanor of the audit team must be perceived as ethical, professional, objective, and fair. The Lead EMS Auditor is responsible for monitoring the activities of the audit team; unacceptable behavior by any audit team member should not be permitted. The Lead EMS Auditor should take whatever action is necessary in response to unacceptable behavior, up to and including removing the responsible individuals from the audit team.

1.2   Overcoming Negative Perceptions

Even in the best situations, an auditor may encounter a certain amount of distrust, anxiety, anger, fear, or obstinacy on the part of the audited organization or section. These kinds of negative responses will hinder the progress of the audit and will detract from the usefulness of the information obtained, unless an effort is made to establish a positive (or at least neutral) setting for the audit. The Lead EMS Auditor must make a concerted effort to establish a productive setting for the audit, from the first verbal contacts, through the opening meeting, daily debriefings, and closing meeting. Because the audit team's primary mission is to obtain reliable information about the performance relative to specific written standards, audit team members must work to gain a functional level of cooperation in order to gain access to objective evidence.

1.3   Negative Situations

Extremely negative responses by audited personnel in an audited organization are rare, but they can occur, and can be difficult to handle when they do. If such a situation should occur, audit team members should politely break off the line of inquiry and bring the matter separately to the attention of the Lead EMS

Auditor, who should attempt to resolve the issue with the section manager. Regardless of the situation, audit team members must never show anger.

If a situation is truly unresolvable, the Lead EMS Auditor should cancel the remainder of the audit, hold a brief closeout meeting with the audited section manager or superintendent to explain the reasons for cancellation, and advise that the audit will be rescheduled after negotiating a new audit date. If at this time the management representative asks the Lead EMS Auditor to continue the audit, the Lead EMS Auditor should state the conditions that are necessary. If the conditions are accepted, then the audit team should resume the audit. If no

request to continue the audit is made, or if the conditions for continuing the audit are not accepted, then the Lead EMS Auditor should direct the audit team to cease its activities.

1.4   Preconceptions

To the extent possible, audit team members must set aside any preconceptions about the audited section capabilities, regardless of whether they are good or bad. No matter how justifiable such assumptions might be, the audited section strengths and weaknesses must express themselves as part of an objective process. Audit team members must never go into an auditing situation with the intention of finding something (or nothing) wrong. If the auditing process is not open and objective, areas of significant strength or weakness may be missed and the accuracy of the information gained from the audit may be compromised.

1.5   Flexibility

The Lead EMS Auditor should be free to redirect the emphasis of the audit in process, as necessary to concentrate the audit team's resources on critical areas of investigation that may come to light in the audit. The areas of emphasis in the audit plan and the checklists should be followed to the extent possible, but if, in the Lead EMS Auditor's judgment, the situation warrants redirection, it is appropriate to concentrate on specific areas of the checklist and not investigate others; another audit may be performed at a later date to investigate other areas of the program.

1.6   Documentation

The audit checklist should be formatted to facilitate inquiries and note-taking, but each audit team member should use the note-taking methods that they are most comfortable with. Reference copies of the WWC Division EMP and its supporting SEOPs and other documents should be readily available to the team.

2.0   AUDITING METHODS: "DO'S" AND "DON'TS"

Audit team members should:

- be prepared; the EMP sections and procedures associated with assigned area of inquiry should be read and understood beforehand;
- stay in charge of any interviewing situation, and steer conversations away from long monologues or irrelevant discussions;
- recognize that the presence of the audit team is by nature disruptive;
- listen and observe more than they talk;
- thank audited personnel for their assistance when there are no more questions;
- take good notes that accurately describe the individuals contacted, the documents reviewed, and the observations made;
- verify or qualify the extent of potential problems by increasing the sample of records evaluated, or by conducting additional interviews;
- frame audit questions in language that the audited organization or department will understand;
- keep questions brief and focused;

- clarify questions if they seem to be misunderstood;
- complement the audited Section when particular strengths are observed;
- ask open-ended questions to open up lines of inquiry or to gain access to additional information; such questions should be phrased using "who", "what", "when", "where", "why", "how", and "which" (none of which can be answered "yes" or "no"); and
- ask closed questions to confirm a point; closed questions should be phrased using words like "is", "do", "has", "can", "will", and "shall", which will result in a "yes" or "no" answer.

Audit team members should not:

- talk too much, argue, use profanity, or discuss personalities or the results of other audits;
- criticize personnel from the audited Section, especially in front of their co-workers or supervisors;
- disagree with other audit team members or the Lead EMS Auditor in front of the audited Section staff; any such discussions should be reserved for the audit team members only;
- permit representatives of the audited Section to see the audit team's working notes or checklists;
- obtain records or documents without the permission or participation of the audited Section;
- identify a problem in front of the audited section personnel as anything other than something that should be looked at further; notes should be taken and specific concerns verified by reviewing a larger sample of information;
- discuss the decision regarding whether the problem requires more investigation or represents a finding without first discussing the issues separately with the Lead EMS Auditor first; or
- make comments regarding the inadequacy of the audited section' EMS processes or procedures, unless objective evidence suggests that audited section' written requirements are not being fulfilled.

SAMPLE EMS DOCUMENTATION

NONCONFORMANCE AND CORRECTIVE ACTION

City of Gastonia WWTP – Corrective/Preventative Action Procedure
City of San Diego WWC – Nonconformance and Corrective/Preventative Action Procedure
City of Eugene WWTP – Nonconformance and Corrective Action Procedure

Standard Operating Instruction – EMS-0100.004 Name: Corrective/Preventative Action Report	**Corresponding Requirements:** EMS Manual: 4.5.2 ISO Standard: 4.5.2 NBP Element: 14
Prepared By: Beth Eckert, Environmental / Administrative Manager	Revision #: 7 Revision Date: 3/9/04
Approved By: Beth Eckert, Environmental / Administrative Manager Signature:	Effective Date: 3/9/04 Page 1 of 3

Corrective / Preventative Action
Standard Operating Procedure

1.0 Purpose

1.1   This procedure is to develop and implement a corrective and preventative action program to monitor, report, investigate and mitigate any impacts caused by the occurrence of non-routine incidents and/or near misses and nonconformance with the Division's environmental policy or any related procedures.

2.0 Associated Equipment

2.1   None

3.0 Associated Documents

3.1   *Corrective/Preventative Action Report EMS-0101.004*

3.2   *Document Control Procedure EMS-0100.002*

3.3   *City of Gastonia: EMS Manual EMS-0100.000*

3.4   *City of Gastonia EMS Manual: EMS-0100.000 and Policy*

3.5   *ISO 14001 Standard: ANSI/ISO 14001-1996 Environmental management systems – Specifications with guidance for use*

3.6   *National Manual of Good Practice for Biosolids*

3.7   *National Biosolids Partnership Biosolids EMS Guidance Manual*

4.0 Procedure

4.1   Corrective/Preventative Action Reports (C/PAR) will be used to identify potential needs for corrective and/or preventative actions identified during EMS review, external and internal regulatory audits, internal and external EMS audits, and following the occurrence of an event that may have a significant environmental impact or a deviation from a current procedure.

4.2   All Corrective/Preventative Action Reports should be completed within 5 working days following first knowledge of an incident or near miss.

4.3   Any employee is empowered to create a C/PAR following an incident or near miss or at any other time the employee wishes to make recommendations for changes to existing procedures or policies and/or to identify the need for addition policies and/or procedures.

4.4   Area supervisors or trained internal auditors are required to develop Corrective/Preventative Action reports for incidents or near misses reported by employees or identified by other means unless an employee has already done so.

4.5   While completing the C/PAR the author should use the following guidance (If another report form such as the state spill report, the internal supervisor's report, or any other detailed report form is required that completely

Controlled copies of this document have a blue signature are on green paper or are on the computer network U drive

satisfies the intent of any of the following sections you may complete that section by typing or writing "See attached form" and attaching a copy to this report):

4.5.1   List personnel who identified the problem.

4.5.2   Describe the problem. If procedure or EMS documents and/or procedures are a focus of the findings then they should be identified by their document control #, when possible. If prompted by an audit the auditor must specify which section of the ISO Standard and/or NBP EMS Guidance Manual the finding is related to.

4.5.3   Provide a root cause analysis, which identifies the source of the problem.

4.5.4   Describe Corrective/Preventative Action.

4.5.4.1   If unable to determine what corrective or preventative actions must be taken to resolve the problem, skip this section. If it's an emergency issue, the supervisor must contact the appropriate personnel to immediately resolve the problem.

4.5.4.2 If able to determine what corrective or preventative actions must be taken to resolve the problem, take appropriate actions. If long-term action is required submit report without completion date for this section.

4.5.5   The author must submit the completed corrective action report to the EMS Coordinator, or designee, along with any and all support data for submittal to the Management Review Board (MRB) at the CPAR meeting.

4.6   MRB will determine if the corrective action that has taken place is sufficient.

4.6.1   Internal auditors will determine if proposed corrective actions are sufficient for C/PARs generated as a result of audit findings.

4.6.2   If sufficient and completed, the report will be signed and returned to the EMS Coordinator for proper filing.

4.6.3   If insufficient or not completed, the Division Manager or designee may assign a new or revised corrective/preventative action to take place, establish a desired completion date, and assign necessary resources i.e. staff time, funds, etc…

4.6.4   CPARs will continue to be reported on during each CPAR meeting until the corrective actions have been completed to the satisfaction of the MRB.

4.7   While modifying a procedure, as a result of a C/PAR, if additional changes are determined to be needed, it is not necessary to write an additional C/PAR if the changes do not change the intent of the procedure. These changes include grammar, re-wording for clarification, spelling, updating of names, phone numbers, and/or references.

4.8   The EMS Coordinator will report final actions to MRB and record completed corrective/preventative action reports on the read-only drive. Any required changes in the documented procedures as a result of the corrective/preventative action will be completed by area supervisors per the Document Control procedure (EMS-0100.002).

5.0 Biosolids Contractor

  5.1 The Biosolids contractor shall be an active participant in the CPAR process.

  5.2 The contractor, or its representative, shall be trained on and is expected to comply with the requirements of the CPAR procedure.

  5.3 The contractor will also be trained on how to generate a CPAR and/or provided a City contact to assist with the generation of necessary CPARs.

  5.4 In addition, when notified by City Staff that Biosolids issues are going to be discussed at a CPAR meeting the Contractor or its representative shall be in attendance.

5.0 **Revision History:**

Revision Date	#	C/PAR #	Reason for Revision	Description of Revision
3/14/02	4	EMS-0074	External Audit	Removal of the section that states that deviations from this procedure must be documented in a C/PAR, the statement appears to give approval to deviate from the procedure.
8/7/02	5	EMS-0084	C/PAR	Added a modification history section
		EMS-0103	C/PAR	Added section stating that additional C/PARs are not required to make minor changes when already revising a procedure as a result of a C/PAR.
		EMS-0116	C/PAR	Added the National Biosolids Partnership (NBP) EMS element number to the header for linkage purposes and document control requirements. Also, added verbiage to include NBP requirement section on C/PAR if applicable.
11/18/03	6		External Audit	Streamlined the auditing and cpar process to complement one another. And for all findings during an audit to be tracked through the CPAR process.
	6		Internal Audit	Included a requirement for MRB to designate resources for complete corrective actions.
3/9/04	7	258	Internal Audit	Inclusion of Biosolids Contractor into the CPAR program.

DD-SEOP 4.5.2

NON-CONFORMANCE AND CORRECTIVE AND PREVENTIVE ACTION

1.0   PURPOSE AND SCOPE

This procedure describes a controlled process for initiating corrective and preventive action in response to externally or internally reported non-conformances that relate to the implementation of the ISO 14001 conforming environmental management system (EMS) established for the Wastewater Collections (WWC) Division of the City of San Diego's Metropolitan Wastewater Department (MWWD).

2.0   DEFINITIONS

2.1   Non-conformance

For the purposes of this procedure, a non-conformance is defined as a demonstrated lack of conformance to the environmental policy commitments and other mandatory provisions of the WWC Division EMS, as documented by the WWC Division Environmental Management Plan (EMP) and the supporting plans and procedures referenced therein.

Non-conformance with planned arrangements (including deviations from established procedures) can be identified by EMS Internal Audits (DD SEOP 4.5.4, Environmental Management System Audits and Compliance Verification), management reviews   (DD-SEOP 4.6.1), or may be brought to the EMR's attention through internal and external communications (DD-SEOP 4.4.3), Communication of Environmental Information (Internal/External).   Corrective action requests may be issued following non-conformances identified by the WWC Division's third-party ISO 14001 registrar during pre-assessments, registration audits, or follow-up surveillances.

2.2   Corrective and Preventive Action Request Forms

Corrective and Preventive Action Request (C/PAR) forms shall be initiated by the Environmental Management Representative (EMR) to facilitate the investigation of non-conformances, the determination of the root causes of non-conformances, the correction of non-conforming conditions, and the specific preventive actions that are deemed necessary to reduce or preclude the likelihood of recurrence.

3.0   RESPONSIBILITIES

3.1   WWC Division Staff and Section Managers

WWC Division staff are responsible for bringing suspected non-conformances to the attention of their assigned Section Managers, or to the EMR.

3.2   Environmental Management Representative (EMR)

The EMR is responsible for evaluating potential non-conforming conditions noted in internal or external communications, EMS audits, management review, or third-party registrar audits and surveillance activities, and for initiating the C/PAR process where non-conformances are

determined to exist. The EMR shall actively participate in the resolution of the non-conformance and shall work with the responsible Section manager or section supervisor to identify appropriate corrective and preventive actions. The EMR is responsible for preparing corrective and preventive action requests, verifying completion, and logging of the issuance and closure. The EMR shall prepare and present a report to management on a monthly basis identifying the current status and resolution of all C/PAR's.

3.3   Responsible Section Manager or Supervisors

Section Managers or Supervisors determined to have primary responsibility for a non-conformance shall participate with the EMR in the evaluation of the non-conformance, determination of the root cause of the non-conformance, determination of appropriate measures to be taken to correct the immediate situation, and the determination of appropriate preventive measures that could reasonably be taken to reduce or preclude the likelihood for recurrence of the non-conformance. It is the responsibility of the Section Manager, Supervisor or assigned management to ensure these corrective and preventive actions are completed within the determined time frame or report the progress and the revised completion dates to the EMR, prior to the original completion date.

4.0   PROCEDURE

The procedure consists of the following steps:

4.1   Upon receipt of environmental communications that indicate a potential non-conforming condition, or upon review of internal or external EMS audits, or management review reports that indicate a potential non-conforming condition, the EMR shall make a preliminary determination of whether or not a non-conformance exists.

4.2   For conditions identified through internal or external communications, and for which no non-conformance is determined to exist, the EMR shall make an appropriate verbal or written response to the originator through the processes defined in DD-SEOP 4.4.3, Communication of Environmental Information (Internal/External), and forward documentation of such action to the environmental records in compliance with Section 5.3 of the WWC Division EMP . If a nonconformance is determined to exist, go to step 3.

4.3   The EMR shall document the nonconformance on a C/PAR form (DD-F-006.0), assign the C/PAR a unique identifier (2 digit year/sequebntial number), and enter basic C/PAR information on the C/PAR Status Tracking Log (form DD-F-007.0).

4.4   The EMR and responsible Section Manager or supervisor shall discuss the non-conforming condition and its fundamental or root causes, and jointly develop appropriate measures that can be taken to correct the near-term condition, as well as preventive measures that could reasonably be expected to reduce or preclude the likelihood of the

recurrence of the nonconformance. The EMR shall forward a copy of the open C/PAR to the Section Manager with primary responsibility for the nonconforming condition, and jointly develop appropriate corrective and preventive actions.

4.5   Root cause determination and proposed corrective and preventive actions shall be briefly summarized on the C/PAR form. Approval signatures are required by the Section Manager, with appropriate implementation signatures and dates upon completion of the corrective action.

4.6   Due dates for completion of the proposed corrective and preventive actions shall be established, and the C/PAR updated as appropriate to document the EMR and Responsible Section manager or supervisors recommendations. Completion dates may be extended as determined necessary by the Section Manager or Supervisor with EMR approval. These extended dates will be noted on the C/PAR in addition to an explanation for the extension.

4.7   The EMR shall track the progress of corrective and preventive action completion using the C/PAR Status Tracking Log, and verify completion of all required actions. Once completion has been verified, the EMR shall indicate C/PAR closure by signature, and the completed C/PAR, with any attachments, shall be forwarded to the environmental records for retention in compliance with Section 5.3 of the WWC Division EMP.

5.0   REFERENCES

WWC Division Environmental Management Plan
        Section 4.3, Communication
        Section 4.6, Operational Control
        Section 5.1, Monitoring and Measurement
        Section 5.2, Control of Non-conformances and Corrective and Preventive Action
        Section 5.3, Records
        Section 5.4, Environmental Management System Audit
        Section 6, Management Review

DD-SEOP 4.4.3, Communication of Environmental Information (Internal/External)

DD-SEOP 4.3.2, Regulatory Tracking and Analysis

DD-SEOP 4.5.4, Environmental Management System Audits and Compliance Verification

DD-SEOP 4.6.1, Environmental Management Review

DD-F-006.0, CPAR Form

DD-F-007.0, CPAR Log

CITY OF EUGENE – WASTEWATER DIVISION
Procedure

Subject:	Nonconformance and Corrective Action			Document No:		WW-00016R3
Last Reviewed By:	Management Team	Date Prepared:	6/26/00	Revision Date:		2/6/03
Approved By:	Management Team	Date Approved:	2/6/03	Next Review Date:		2/1/05

Purpose

This procedure describes the process to ensure that the Division establishes, maintains and uses a system to identify nonconformances from regulations or requirements and to specify a process to identify and track corrective and preventive actions.

Scope

This procedure applies to all nonconformances requiring corrective or preventive action by staff. These will typically identified by the following methods:

- Internal and external audits
- Environmental Compliance Audits
- Safety Audits
- Inspections
- Incident Reports
- Complaints
- Compliance Inspections
- Permit Inspections

Definitions

- Audit Team
- Corrective Action Request (CAR)
- Environmental Compliance Assessment
- EMS
- EMS Manager
- External Auditors
- Nonconformance

Safety Requirements

All specific safety requirements will be included or referred to in specific work instructions.

Procedure (Include reporting requirements and precautionary steps in this section)

Accountability: **Responsibility:**

Division Management Team   Provide appropriate resources to ensure nonconformances are corrected.

Audit Team	Conduct conformance audit/internal or external assessment.
Audit Team Staff	Identify potential nonconformance and notify supervisor and Audit Team member by e-mail.
Audit Team	Determine whether the potential nonconformance meets the criteria for a nonconformance or an observation.
Lead Auditor	Enter nonconformance or observation information into CAR Database. Select either "finding" or "observation."
	Submit CAR information to EMS Manager by e-mail.
EMS Manager	Review corrective or preventive action request information and inform Division Management Team of any identified nonconformance that involves a potential regulatory or legal noncompliance.
	Determines appropriate staff to take corrective or preventive action. Enters appropriate staff name into CAR Database, and request corrective or preventive action.
Division Staff	Identify the cause of the nonconformance.
	Identify appropriate corrective or preventive action. Complete Corrective Action Approval Request in CAR Database and forward electronically to EMS Manager, with copy to work section supervisor (if supervisor does not complete form).
EMS Manager	Reviews Corrective Action Approval Request. Requests additional information if necessary. Consults with Division Management Team prior to approving . recommended corrective or preventive action.
Division staff	Implement the necessary corrective or preventive action.
	When corrective or preventive action is completed, fill out Corrective Action Completion Details form in CAR Database. Forward by e-mail to EMS Manager.
EMS Manager	Closes corrective or preventive action.
Internal Auditors	Include review of completed corrective or preventive actions in scope of audits.

References

- ISO 14001 Standard, 4.5.2 Non-conformance and Corrective and Preventive Action
- EMS Manual, Nonconformance and Corrective Action Policy
- Internal Audit Procedure
- Monitoring and Measuring Procedure

SAMPLE EMS DOCUMENTATION

MANAGEMENT REVIEW

City of Eugene WWTP – Management Review Procedure
City of San Diego WWC – Environmental Management Review Procedure

CITY OF EUGENE – WASTEWATER DIVISION
Procedure

Subject:	Management Review			Document No:	WW-00019
Last Reviewed By:	Management Team	Date Prepared:	8/8/00	Revision No:	3
Approved By:	Management Team			Date Approved:	2/13/04

Purpose

The purpose of this procedure is to define the minimum requirements for conducting management review of the Division's Environmental Management System.

Scope

This procedure applies to management reviews performed by the Division Management Team and the EMS Team. Management reviews will consist of comprehensive annual evaluations to determine the adequacy of the:

- Division's environmental policies and procedures
- Current environmental objectives and targets
- Overall effectiveness of the EMS in facilitating achievement of environmental objectives

Definitions

- Division Management Team
- EMS
- Environmental Objective
- Environmental Target

Safety Requirements

All specific safety requirements will be included or referred to in specific work instructions.

Procedure (Include reporting requirements and precautionary steps in this section)

Accountablity: Responsibility:

EMS Manager   At least annually, coordinate and conduct management reviews.

Summarize data from:

- EMS audits
- objectives and targets information
- correspondence from interested parties
- significant changes to the EMS
- other relevant documentation concerning the EMS

Manage production of Division Annual Environmental Report

Supervisors	Review work section's activities semi-annually in relation to EMS objectives and targets, training, and aspect management. Provide summary and recommendations for improvements to EMS Team.
EMS Teams	Document any observations, conclusions and recommendations for improvement. Prioritize needed EMS conclusions and recommendations for improvement and report to EMS Manager.
EMS Manager Division Management Team	In management review, evaluate the above information to assess the effectiveness of the EMS, and if it is contributing to continual improvement of the Division's environmental performance. Assign responsibility and deploy resources to facilitate changes to EMS. Distribute findings of semi-annual reports to Division Staff.
EMS Manager	Create record of management review meeting(s), and forward to Document Control Specialist
Document Control Specialist	File record of management review.
Supervisors	Implement necessary changes, or assign responsibility for necessary changes. Follow Documentation/Document Control Procedure. Communicate any policy and procedural changes to staff.
Division Staff	Comply with changes to the EMS.

References

- ISO 14001 Standard, 4.6 Management Review
- EMS Manual, Management Review Policy
- Documentation/Document Control Procedure.

DD-SEOP 4.6.1

ENVIRONMENTAL MANAGEMENT REVIEW

1.0   PURPOSE AND SCOPE

The purpose of this procedure is to define the minimum requirements for conducting annual, independent management reviews of the ISO 14001-based environmental management system (EMS) established for the City of San Diego's Metropolitan Wastewater Department (MWWD) Operations and Maintenance (WWC) Division. This review will be conducted in order to ensure the effectiveness, sustainability and adequacy of the EMS with the objective of continual improvement. This procedure covers all personnel affecting WWC's operations, activities, and products

2.0   DEFINITIONS

2.1   Management Reviews

Management reviews are defined as comprehensive evaluations performed by or at the direction of the Deputy Director, WWC Division in order to determine the adequacy of

- the WWC Division's environmental policy;
- current environmental objectives and targets relative to the WWC Division's overall policy goals; and
- the overall effectiveness of the EMS in facilitating the achievement of environmental policy goals and specific environmental objectives.

Management reviews should not be confused with periodic EMS Management Team briefings, internal EMS audits (see DD-SEOP 4.5.4, "Environmental Management System Audits") or third-party ISO 14001 EMS registration audits. However, management reviews should consider the results of recent internal and third-party EMS audits, along with 1) the extent to which objectives and targets have been met; 2) changing operational or regulatory conditions; 3) the concerns of interested parties; or 4) future needs or other external factors which may affect the necessary structure and content of WWC Division's EMS.

2.2   Interested Party

An interested party is defined as any individual or group concerned with, interested in, or potentially affected by the environmental performance of the WWC Division. Examples of interested parties may include regulatory agencies or authorities; community groups; environmental organizations; the press; or employee organizations.

3.0 RESPONSIBILITIES

3.1 Deputy Director, WWC Division

The WWC Division Deputy Director is responsible for performing or supervising the performance of independent, documented, annual management reviews of WWC Division's EMS, as described in this procedure.

3.2 Environmental Management Representative

The Environmental Management Representative (EMR) is responsible for assisting the Deputy Director, WWC Division or his designee in the performance of management reviews by providing audit reports, environmental performance data summaries, environmental communications records, third party audit correspondence, or other information as may be requested. The EMR is also responsible for the planning and execution of any mandatory action items that may be established as a result of the management review.

4.0 PROCEDURE

The management review process is described in the following steps and is summarized as a flowchart in Figure 1:

4.1 Management review shall be conducted at least once a year, however, may be more frequent depending on internal or external audit activities.

   The management review team shall consist of the following members:

   • Deputy Director (or designee)
   • EMS Management Representative
   • EMS Steering Committee members i.e. Section Managers and designees

4.2 If for any reason an EMS Steering Team member cannot attend the meeting, he/she appoints an alternate person to represent his/her function at the meeting. At least 75% of the EMS Steering Team shall be in attendance to meet the management review attendance requirement.

4.3 The EMS Management Representative is responsible for:

   • setting up management review meetings;
   • assigning responsibility for taking the meeting minutes to one of the meeting attendees;
   • publishing the meeting minutes; and
   • ensuring the meeting minutes and attendee list are retained according to record retention procedural requirements.

4.4 The EMS Management Representative prepares and issues the meeting agenda in advance that may include some or all of the topics listed in Figure 1.

4.5   The EMS Management Review Team shall discuss the agenda items and assess the effectiveness, suitability and adequacy of the management system. Some or all of the following shall be used in the assessment process:

- progress of objectives and targets
- overall program results
- internal and external audit results
- closure of C/PARs
- risk assessment results
- other policy and procedure modifications relative to operational changes

4.6   Assessment results, decisions, and action items from the meeting are recorded in the Management Review Meeting Minutes Summary Form.   The EMS Management Representative shall keep these minutes according to DD SEOP 4.5.3, "EMS Recordkeeping"..

4.7   The EMS Management Representative or his/her designee shall monitor progress to ensure that action items raised during the management review are promptly addressed. Areas needing improvement shall be planned into the next internal audit.

5.0   REFERENCES

WWC Division Environmental Management Plan,
Section 2, "Environmental Policy";
Section 3.3, "Objectives and Targets";
Section 5.3, "Records";
Section 5.4, "Environmental Management Systems Audits";
Section 6, "Management Review".

DD-SEOP 4.3.3, "Establishment of Environmental Objectives, Targets and Programs"

DD-SEOP 4.4.3, "Communication of Environmental Information (Internal /External)"

DD-SEOP 4.3.4, "Environmental Action Requests"

DD-SEOP 4.5.4, "Environmental Management System Audits and Compliance
                        Verification".

FIGURE 1

MANAGEMENT REVIEW PROCESS

(DD-SEOP 4.6.1)

FIGURE 1A - SAMPLE EMS MANAGEMENT REVIEW MEETING

Month, Date, Year

Agenda

To meet WWC's commitment to continual improvement of the EMS, a discussion of the continuing suitability, adequacy and effectiveness of the EMS topic(s) discussed will be carried out through a review of the EMS. The EMS topics(s) discussed during the EMS Management Review meeting, findings, and any action items assigned must be recorded on the EMS Management Review Minutes Summary Form (See Doc. No. DD-F-010.0). Example agenda items are listed below:

- Review overall EMS system
- Review Environmental Policy
- Review significant aspects/hazards and impacts/risks
- Review and approve EMS objectives, targets, and programs (versus program results)
- Review environmental compliance performance
- Review environmental training system
- Review internal and external communications processes, including communication of significant environmental issues
- Review EMS internal and external audit findings
- Consider possible improvements in the EMS as it has been developed
- Discuss budgets and expenditures since last management review
- Discuss site preparations for any up-coming third party EMS audits
- Other agenda items

The following must be addressed and documented on the EMS Management Review Meeting Minutes Summary:
- Is the EMS topic/issue discussed suitable, adequate, and effective? If not, indicate proposed changes and/or improvements.
- Are changes to policy, objectives, or other areas of the EMS necessary? If so, indicate change(s) and proposed implementation method.
- Any additional action items/areas for improvement

FIGURE 1A

SAMPLE EMS MANAGEMENT REVIEW MEETING

Agenda (Continued)

In order for management to effectively carry out their review, the following documents/items listed below are examples of reference materials that may be used during the EMS management review meeting. Additional reference materials not listed below may also be used. All applicable documents or other information utilized during the meeting must be attached and/or referenced in the EMS Management Review Minutes Summary Form (See Doc. No. DD-F-010.0) and/or meeting minutes.

- A review of previous EMS Management Review meeting minutes/action items
- Applicable environmental incidents, non-conformances and corrective action plans/reports
- Applicable employee suggestions and safety committee meeting minutes
- A review of applicable WWC EMS metrics
- New or changed legislation
- Changes in applicable technology, including work processes
- Changes in business environment or WWC's financial and/or competitive position that may influence policy, objectives and targets

FIGURE 2A

EMS MEETING ATTENDANCE SHEET

DD-F-010.0

MANAGEMENT REVIEW MEETING MINUTES SUMMARY FORM

Meeting Date:

Item #	EMS Topic Discussed	Suitable	Adequate	Effective	Policy	Objective(s)	Other Elements	Action Item(s)/Notes	Target Date
		(Y/N)			Change Necessary? (Y/N)				
1									
2									
3									
4									

* Use additional forms or attachments as necessary

Appendix B

EMS Supplemental Toolbox

I.   EMS Presentation

II.   Communication

III.   Gap Analysis Checklist

IV.   EMS Software

V.   Compliance Checklist

VI.   Training

VII.   EMS Internal Audit

EMS SUPPLEMENTAL TOOLBOX

EMS PRESENTATION

Gastonia Wastewater – EMS Implementation and Development

City of Gastonia
Wastewater Treatment Division

Environmental Management System Development and Implementation

Presented By: Donald E. Carmichael, P.E.,

Director of Public Works and Utilities

Beth Eckert, Industrial Chemist/

EMS Coordinator

Overview of the City of Gastonia's Wastewater Treatment Division

- Two wastewater treatment facilities
- Approximately 11.0 million gallons of wastewater treated daily
- Treatment facility staff of 51 employees
- 23 significant industrial users; 6 general permits issued

How Gastonia Became Interested in an EMS?

- Attended NCDPPEA - ISO 14001 seminar
- Spoke with our Industries who were seeking ISO 14001 certification
- Recognized how it could benefit our organization by helping us to:
  - Minimize and potentially eliminate noncompliance
  - Minimize our impact on the environment
  - Provide consistency over time within the operation
- Became a pilot program with the State of North Carolina

Approval from
Gastonia's City Council

- Several members were businessmen, who were familiar with ISO standards, the consistency of application and policy it brings to an organization and recognized the benefit to the City

- Good environmental stewardship

- Above and beyond compliance with laws and regulations

- Proactive - not reactionary

- Recognized intangibles, such as improved public image

Who will Develop the EMS?

- Management selected the following personnel:
  - EMS Coordinator
  - EMS Team

- Staff Member from NC Div. of Pollution Prevention and Environmental Assistance assisted the City

- Ideas and suggestions were sought from all employees

EMS Coordinator

- EMS Coordinator was trained by an external source on ISO 14001.

- Responsibilities include:
  - Training the rest of the WWTD staff on ISO 14001 Environmental Management Systems
  - Guiding development and ensuring that progress was being made on the EMS
  - Ensuring conformance to the ISO 14001 standard

EMS Team

- Responsibilities include:
  - Being the core group of people who develop the EMS
  - Developing and reviewing aspect and impacts
  - Developing and reviewing procedures
  - Training of personnel in their respective areas

NC DPPEA Staff Member

- John Burke helped in every step.

- He had previous experience in EMS development, which provided the City with a starting point for each step.

- He helped with training, procedure development, form development, etc…

- He also helped to ensure that our procedures and programs conformed to the ISO 14001 standard

Gastonia Began EMS Development

- Kick-off meeting was held February 2, 1999.
  - ISO 14001 EMS training of the EMS Team
  - Development of a strategy and timeline for EMS implementation

ISO 14001 EMS Policy/Objectives

EMS policy is developed, significant aspects and regulatory requirements identified, and objectives and targets established.

ISO 14001 Elements

1)Environmental Policy; 2) Significant Environmental Aspects and Impacts; 3) Legal Requirements; 4) Objectives and Targets

REVIEW

Upper management reviews various reports at regular intervals to determine the need for changes to policy, objectives, and/or procedures.

ISO 14001 Elements

Management Review

STRUCTURE/RESPONSIBILITY

To carry out the policy and objectives, employees are trained on procedures relevant to their work activities and consequences of departure from those procedures. Employees are made aware of their roles and responsibilities.

ISO 14001 Elements

1)Roles and Responsibilities; 2) Training, Awareness, and Competence; 3) Operational Control; 4) Internal and External Communication; 5) Emergency Preparedness and Response; 6) Document Control

CHECKING/CORRECTIVE ACTION

A monitoring program is established to evaluate environmental performance. Employees can report problems to management through corrective action reports. Audits are conducted to evaluate EMS effectiveness

ISO 14001 Elements

1) Corrective and Preventative Action Program; 2) EMS Auditing; 3) Monitoring and Measuring Program; 4) Record Keeping

Policy and Objectives

Environmental Policy

- An environmental policy was developed by the EMS team

- Approved by City Council on March 16, 1999.

- The policy is located on Gastonia's website at www.cityofgastonia.com

Aspects and Impacts

- An aspect and impact procedure and forms were developed
- Aspects and impacts were:
  - identified
  - rated high, medium, or low for severity and frequency
  - significance was determined
- The EMS Team took approximately 3 months to determine significance - done by June, 1999.

Legal and Other Requirements

- Identified and made a list of all legal and other requirements for the WWTD:
    - Permit effective and expiration dates
    - Compliance report due dates
    - Contract dates, etc...
- Determined a procedure for keeping them current
- C/PAR resulted in adding EMS review dates

Objectives and Targets

- The EMS team developed a list of objectives and targets for the division based on:
  - Significant aspects and impacts
  - Legal requirements
  - Interested third parties
  - Economical concerns
  - Technological concerns

Structure and Responsibility

Who had Responsibilities under the EMS?

- Successful EMS must involve every level of personnel from Trades Helper to City Council Member

- EMS Team developed a document entitled Roles and Responsibilities
  - Lists every position and their responsibilities as they pertain to the EMS

Structure of the EMS

- EMS manual which outlines the City's EMS

- Procedures both for the operation of the management system and the operational controls of the facilities

- Awareness and procedural training

- Development of forms and supporting documentation

EMS Manual

- Format based on the ISO 14001 standard to assure the EMS was structured to meet the requirements of the standard

- Written by EMS Coordinator, reviewed by the EMS team and approved by the Superintendent of the WWTD

EMS Procedures

- Created as a direct result of the ISO 14001 standard, like the following:
  - Document Control
  - Training
  - Aspect & Impact
  - Corrective / Preventative Action
  - EMS Auditing
  - External Communication
  - Monitoring and Measuring
- Standard only requires 3 documented procedures: monitoring and measuring, compliance audits, and operational controls

Document Control

- Document numbering system
  - Divisional documents have EMS numbers
  - Site specific documents are identified as such by a specific prefix
  - Procedures and forms are listed on the Document Control Matrix

- Signatures on original documents are blue

- Controlled copies
  - Green paper
  - Computer (read-only drive)

- All other documents are uncontrolled

Document Control Matrix

Document Title	Document #	Revision	Retain	Frequency	Controlled Copy Locations
ENVIRONMENTAL MANAGEMENT SYSTEM DOCUMENTS					
Procedures for Environmental Management System					
Environment Management System Manual	EMS-0100.000	0	As Needed	As Needed	◆ U: Drive 1. Long Creek Operations 2. Crowders Conf. Room 3. PW Director's Office 4. Pretreatment Office 5. Superintendent's Office
EMS Review Procedure	EMS-0100.001	0	As Needed	As Needed	◆ U: Drive 1. Long Creek Operations 2. Crowders Conf. Room 3. PW Director's Office 4. Pretreatment Office 5. Superintendent's Office
Document Control Procedure	EMS-0100.002	0	As Needed	As Needed	◆ U: Drive 1. Long Creek Operations 2. Crowders Conf. Room 3. PW Director's Office 4. Pretreatment Office 5. Superintendent's Office

Training

- Training for Everyone
  - EMS policy
  - EMS awareness
  - Corrective/preventative Action
  - External Communication
- Supervisors determine who is to be trained on specific operational control procedures
- Training is documented and listed on the training matrix

Training Matrix

EMS Management Procedures

Document Title	Document #	Rev	Coleman Keeter	Larry Cummings	Diane Shumate	Opal Morgan	Beth Eckert	Janet Maddox	Nancy Matherly	Christina Johnson	Bobby Hanna	Charlie Graham	David Hux	Jim Eiden
Awareness Training	N/A	N/A	5/9/00	5/9/00	8/11/00	8/29/00	NR	5/9/00	5/12/00	9/11/00	5/12/00	5/12/00	5/9/00	5/11/00
Environment Management System Manual	EMS-0100.000	0	NR	2/14/00			NR							3/8/00
EMS Review Procedure	EMS-0100.001	0	8/30/00	2/14/00			NR	4/10/00					5/8/00	3/8/00
Document Control Procedure	EMS-0100.002	0		2/14/00			NR	4/10/00					5/8/00	3/8/00
Aspects and Impacts Procedure	EMS-0100.003	0	5/15/00	2/14/00			NR	5/10/00					5/8/00	3/8/00
Corrective/Preventative Action Report Procedure	EMS-0100.004	2	5/9/00	5/9/00	8/30/00	8/29/00	NR	5/9/00	8/28/00	9/11/00	8/30/00	8/30/00	5/9/00	5/9/00
Training Procedure	EMS-0100.005	1		12/18/00			NR	4/10/00					12/18/00	12/18/00
Roles and Responsibilities Listing	EMS-0100.006	0	8/30/00	2/14/00	8/30/00	8/29/00	NR	4/10/00	1/27/00				5/8/00	3/8/00
Objective and Targets - Improvement Plan Summary	EMS-0100.007	1	NR			8/29/00	NR							
External Communications Procedure	EMS-0100.008	1	6/28/00	6/28/00	8/11/00	8/29/00	NR	6/28/00	6/29/00	9/11/00	8/30/00	8/30/00	8/4/00	6/28/00
Environmental Management System Audit	EMS-0100.011	0					NR						5/8/00	
Sewer Overflow / Reporting Procedure (Press Release);Media List; Distribution list; Emergency Phone list	EMS-0100.012	3	NR		9/1/00		NR							9/1/00
Monitoring and Measuring Procedure	EMS-0100.013	0		NR			NR							
Legal and Other Requirements	EMS-0101.001	1		NR										

Operational Controls

- Developed as a result of what the EMS Team determined to be significant to the Gastonia WWTD

- Developed to help achieve an Objective and Target set by the Gastonia WWTD

Checking and Corrective Action

Checking / Corrective Action

- The EMS is designed to continually improve itself through the following programs:

    - Monitoring and measuring

    - Corrective/Preventative Action Reports

    - Internal Audit Program

    - Management Review

Monitoring and Measuring

- Procedures for tracking and documenting the impacts the WWTD is having on the environment
- Measurements are taken and records are maintained for each area related to the impacts determined to be significant
  - proper calibration is required and documented of all equipment related to these measurements
- Audits are conducted and documented

Corrective/Preventative Action Reports

- All employees are encouraged to complete C/PARs, as the result of:
  - system failure
  - procedure deviation
  - recommendation for improvement, etc...
- C/PARs are reviewed by the management review board
  - C/PARS remain open until it is determined by the Superintendent that sufficient action was taken and completed

Audit Program

- Auditors trained by an external source in ISO 14001 Auditing
- Auditors from each area of the WWTD
- Each area audited biannually and audit reports generated
- Responses are received from the area supervisor
- Follow up is done to assure all findings have been corrected.

Management Review

Management Review Board

- Monthly review of C/PARs
- Quarterly review of:
  - Status of the EMS procedures and training
  - Results of the monitoring and measuring actions
  - Progress on objectives and targets
  - Audit results

Benefits of the EMS

- Enhanced cooperation among staff
  - Within the WWTD as well as with other Divisions in the City
  - Consistency in applications, despite employee turnover
- Public awareness of the City's commitment to environmental excellence
- Improved relationships with State authorities
- Controlled documented procedures
- EPA accepted the EMS documentation and/or descriptions as the WWTD's portion of the MOM program

Plans for our EMS

- Become Certified
  - Why?
    - Third party confirmation that our EMS conforms to the standard
    - Positive recognition for the City's efforts
- Expand to other areas of the Public Works Department

Summary

- The City of Gastonia has taken the position that we would like to consistently go above and beyond compliance.

- We feel that ISO 14001 is a large step in that direction because:
  - Establishes a framework for an EMS
  - By design it provides for continual improvement
    - Maintain a proactive approach to compliance
    - Provides a systematic progressive solution to current and future problems

EMS SUPPLEMENTAL TOOLBOX

COMMUNICATION

Clark County, Washington Public Works - Questions for Frontline Employees
City of San Diego WWC – Quarterly EMS Newsletter
City of Eugene WWTP – News Article
City of Charleston CPW EMS Policy and Commitment Statement
City of Charleston CPW - WCD Associate Recognition Program

Environmental Management System (EMS)
Introductory Questions for the Shop Floor

1. Are you aware of the positive environmental work being done by Equipment Services? What?

2. In your mind what are the top 3 things the shop does that can or does negatively impact the environment?

3. What is the shops greatest opportunity for environmental improvement?

4. Do any environmental regulations affect the shops? If yes, what are they and how do they apply to you?

5. If you have concerns about a product or a material where do you go for information?

6. Is the environment important to you? How or why?

7. Does this environmental policy work for you?

   C – Compliance with Regulations
   C – Continuous Improvement
   P – Pollution Prevention
   W – Working Together toward Sustainability

8. What do we need to get the buy-in from your fellow employees to make this EMS project a success?

9. Can you think of something this EMS project can do for you to make your job more rewarding?

10. What could management provide you to be a better environmental shop supporter?

Did You Know?

STANDARD OPERATING PROCEDURES (SOP):

- ❖ WWCD has currently incorporated 36 new SOPs into the MWWD/WWC Operations and Policy Manual
- ❖ Where are these located?
  All Section Managers (GWUS, Project Manager, Senior Civil Engineer, And Senior Management Analyst) have controlled copies in their office.
- ❖ Who is responsible for complying with these SOPs?
  Every employee of the Wastewater Collection Division
- ❖ Who is responsible for training on SOPs?
  You're Immediate Supervisor

WHO IS YOUR ENVIRONMENTAL MANAGEMENT TEAM (EMT)?

Jose Oropeza – Construction   Gary Neel - NROW
Terrell Powell – ROW   Angela Salah - Administration
Bert Seldura – SPSIOM   Pashant Pandya – Maintenance Coordinators
Nabeel Qawasmi – Engineering   Kristen Ikeda – FEWD
Mike Whelan – CCTV   Johnny Mitchell
Rick Donahue

WHO IS YOUR ENVIRONMENTAL MANAGEMENT SYSTEM STEERING COMMITTEE (EMSSC)?

Chris Toth, Deputy Director   Bill Denhart, Assistant Deputy Director
Rick Donahue, Environmental Management Rep.   Johnny Mitchell, Alternate Environmental Management Rep.
Alex Acosta Mathis, Senior Management Analyst Mike Bedard, G.W.U.S.
Leroy Davis, G.W.U.S.   Kevin Gensler, G.W.U.S.
Isam Hireish, Senior Civil Engineer   Mike Giehl, FEWD Program Manager

UPCOMING EVENTS:

September 8, 9, 10, 2003   ISO 14001 Internal Audit
November 2, 3, 4, 2003   ISO 14001 Final Assessment Audit

City of Eugene
CityNews

News from people at the City of Eugene

April 4, 2002

As part of its on-going effort to keep the community informed and involved, the City of Eugene publishes this weekly newsletter highlighting the work being done to make Eugene a better place.

*Click here to see a listing of this week's **Public Meetings Calendar***

Past City News Pages

Table of Contents

AROUND THE CITY

Fire Department Earns Renewal of State Exemption

Oregon State Fire Marshal Bob Garrison has granted the City of Eugene a renewal of its exemption from adhering solely to fire safety codes adopted by the State, and from oversight of the City's fire prevention programs by the State office. With the exemption, the City is free to adopt codes and code amendments that address specific local issues. This has been done on a number of occasions, and the option remains open to the City as an exempt jurisdiction should other issues arise.

A jurisdiction can be granted an exemption by meeting certain criteria in the area of fire prevention; that is, the local fire department must assume responsibilities including code enforcement, fire investigation, public education, juvenile firesetter counseling, and others. At this time, only nine Oregon jurisdictions including Eugene have the exemption. Mr. Garrison will come before the City Council on April 8 to present Eugene's certificate of exemption. For more information, please contact Acting Fire Marshal Reggie Augsburger at 682-5411.

Environmental Management System Saves Trees, Water, Power

The new Environmental Management System at the Wastewater Division helped save more than half a ton of paper in the past year using simple reduction strategies.

Wastewater's Environmental Management System established targets to reduce paper use and increase the post-consumer content of paper products that are used. The division has employed

a number of simple strategies over the past year in an effort to accomplish these goals. These strategies include reducing the default margins for printed documents, using duplex options on the division's printer, reformatting reports to use less paper, and installing cloth towel dispensers in restrooms. In addition, the division has written guidelines for the use of paper and established purchasing requirements for post-consumer content. Staff is encouraged to use electronic media for correspondence, and computers or overheads are used at meetings instead of handing out paper copies of agendas and informational materials. These efforts have been supported with reminder stickers on equipment and training for all employees on paper reduction targets and objectives.

The division's goal for last year was to reduce overall consumption of paper goods by 30%. A monitoring report shows that the actual reduction was approximately 20%, and the 30% target will be retained as next year's goal. In terms of specific reductions, the amount of paper used was cut by 0.6 tons or around 120,000 sheets of paper. The goal for using recycled paper was that 70% of the gross amount of all paper goods purchased would be made from recycled material with a minimum of 30% post-consumer content. The Wastewater Division exceeded this goal by using 97% recycled paper and will change the goal for the next year to 99%. The environmental benefits from these efforts can be stated in the following terms: ten 50-foot-tall trees saved, 12,300 gallons of water saved, 6,470 kilowatt-hours of electricity saved, and 2.6 cubic yards of landfill space that did not have to be used. Using recycled content also saves water and power since each ton of paper made with recycled fibers saves 7,000 gallons of water and 4,100 kilowatt-hours of electricity. For more information, contact Peter Ruffier, Wastewater Division Director, at 682-8606.

COMMISSIONERS OF PUBLIC WORKS
CITY OF CHARLESTON, SOUTH CAROLINA

ENVIRONMENTAL MANAGEMENT SYSTEM POLICY

POLICY STATEMENT:

The Charleston Commissioners of Public Works (CPW) is committed to the supply, treatment, and delivery of safe potable water and the collection, treatment, and disposal of wastewater in an environmentally sensitive and responsible manner. This policy establishes the commitment to meeting all applicable federal, state, and local laws, regulations, and statutes. In addition, it establishes the commitment, working cooperatively and openly, to meet customer and community water quality and environmental expectations. It establishes the commitment to improving cost and resource efficiencies. Further, this policy establishes the framework for setting and reviewing environmental objectives and targets with the intent of preventing pollution, protecting the environment, and continually improving environmental performance for present and future generations.

POLICY IMPLEMENTATION:

Recognizing that many aspects of operations carried out at CPW can impact the environment, this policy establishes the directives for all associates. This policy shall be formally communicated and explained to all CPW associates and made available to the public. It shall be centrally maintained and updated as necessary to reflect the changing needs and goals of CPW.

The CPW Environmental Management System (EMS) established by this policy, shall pursue and measure continual improvement in performance by establishing and maintaining documented environmental objectives and targets that correspond to the mission, vision, and core values adopted by CPW. In addition, CPW shall conduct its operations to:

- Emphasize environmental vigilance over CPW resources, processes, products, wastes, contamination and prevention of pollution.
- Develop management and associate commitment to the protection of the environment and prevention of pollution. Set clear environmental objectives and targets with clear assignment of accountability and responsibility and implement Environmental Improvement Programs.
- Commit to compliance with the letter and spirit of all applicable, federal, state, and local laws and regulations.
- Plan, design, develop, construct, operate, and maintain facilities to encourage resource-efficiency and the protection and improvement of the quality of the environment.
- Encourage integration of environmental planning into the strategic business plan.
- Establish a management process for achieving targeted environmental performance by routinely monitoring and reporting on significant environmental aspects.
- Implement a process of continual quality improvement for environmental management with the goal of achieving and maintaining third party certification for the EMS.
- Establish an effective environmental communication program with external environmental stakeholders such as the South Carolina Department of Health and Environmental Control (SCDHEC), community groups, and other interested parties as needed.

The Environmental Management System shall undergo review by the CPW officers on an annual basis. The effective date of this Environmental Policy is the 15th day of October, 1998.

Committed to by the associates of the Water Distribution Department for the Commissioners of Public Works of the City of Charleston, South Carolina.

Steve W. Kinard Manager	William E. Koopman, Jr. Assistant Manager	John B. Cook, P.E. Director of Engineering	Patric M. McClellan Director of Administration Services
Anderson, J.	Baker, M.	Bickerstaff, R.	Brown, F.
Brown, W.	Buncomb, E.	Carcueva, M.	Champagne, C.
Cockrum, J.	Copleston, P.	Couche, D.	Cummings, N.
Cypress, J.	Dais, B.	Daniels, D.	Dombrowski, K.
Eldredge, T.	Ellis, E.	Franks, D.	Gaillard, F.
Giacomarro, M.	Green, K.	Hamilton, B.	Heyward, M.
Hill, K.	Hoagland, R.	Jenkins, J.	Jenkinson, D.
LeBlanc, C.	Marks, J.	McCrady, A.	McCutchen, J.
Middleton, A.	Middleton, F.	Moore, P.	Myers, R.
Nelson, R.	Nesbitt, R.	Oberoi, K.	Prentiss, J.
Ravenel, A.	Relyea, J.	Remington, W.	Richardson, E.
Richburg, T.	Roszell, D.	Sageser, R.	Sam'l, E
Sanders, G.	Sanders, L.	Scott, L.	Simmons, N.
Singleton, J	Smalls, L.	Smiley, J.	Sordelet, C.
Staggers, W.	Sullivan, K.	Watson, L.	White, L.
Whitsett, K.	Williams, B.	Williams, C.	Wright, St. J
Young, L.			

Commissioners of Public Works
of the City of Charleston, SC

Wastewater Collection Department
Associate Recognition Program

Prepared By:

the WWCD Employee Recognition Committee

and the

Employee of the Quarter/Year Committee

Approved by: _____
             Adrian Williams, Superintendent

Revision: 2002-0; Effective Date: September 01, 2002

Revision: 2002-0 Effective Date: September 1, 2002	Prepared By: Asso. Recognition Committee and the EOQ/EOY Committee	Approved By: Adrian Williams, Superintendent

Award Program Index

Committee Members:

WWCD Employee Recognition Committee:

Rick Bickerstaff
Letty Clay
Rodney Cromwell
Larry Ferguson
Ronnie Inabinet
Robert Simmons
W.C. Swain

Employee of the Quarter/Year Committee:

Ronnie Inabinet
Chris Hendricks
Jeff Tisdale
Solomon Wade
Earnest Washington
Susan Roberts

Revision: 2002-0 Effective Date: September 1, 2002	Prepared By: Asso. Recognition Committee and the EOQ/EOY Committee	Approved By: Adrian Williams, Superintendent

Employee of the Quarter:

The recommended procedure for recognizing an associate as the Employee of the Quarter (EOQ) is as follows:

Recommendation Procedure:
- The EOQ Chairperson will initiate a reminder for nominating associates for this award. Reminder will be forwarded via e-mail, interoffice memo or verbally during a scheduled department meeting.
- Any associate within the WWCD may be recommended for this award by any other associate within the department.
- Recommendation forms are available at the Ballot Box (Suggestion Box) located under the WWCD bulletin boards at the rear of the facility.
- All nominations must be placed in the Ballot Box by the time and date specified by the EOQ Chairperson.

Eligible Associates:
- All full-time departmental associates are eligible. New associates become eligible at the end of their orientation period.
- No associate who has been chosen within the past 6-month period is eligible.
- Associate(s) become ineligible if they have received a disciplinary action, i.e., written warning, days off, etc., for policy violation during the quarter.

EOQ/EOY Recognition Committee:
The Recognition Committee will be comprised of employees chosen by their peers or established through volunteering. The committee will equitably represent all sections and levels of the department.

Recognition Committee Members:
- Chairperson, chosen by the committee members, will serve a 2-year term.
- Committee members, either appointed or as volunteers, will serve a 1-year term.
- One representative from each section of the department is required.
- When possible past winners may be chosen to serve as committee members.
- Advisor(s) - as required.

At the end of a Chairperson's term, the existing committee members and new members will nominate and appoint a new Chairperson. The new Chairperson may be one of the existing committee members nearing the end of their term.

Committee members will seek their own replacement at the end of their term. A committee member's replacement should be from their current section unless otherwise approved by the Superintendent.

Revision: 2002-0 Effective Date: September 1, 2002	Prepared By: Asso. Recognition Committee and the EOQ/EOY Committee	Approved By: Adrian Williams, Superintendent

The Superintendent or Assistant Superintendent may act as an advisor to the committee, but will carry no vote.

EOQ Selection Process:
- The Recognition Committee will meet on the third week of the last month of each quarter.
- The committee members will review all nomination forms and the details included on the forms, and will discuss the following:
  - ✓ Excels in general productivity
  - ✓ Willingness to assist associates throughout the department
  - ✓ Contributes to the goals of the department
  - ✓ Commendable customer service
  - ✓ Team oriented
  - ✓ Positive attitude

- The committee will vote on the nominees, and the nominee with most votes will be awarded EOQ.
- In the case of a tie vote, the Superintendent will make the final decision.

  All associates' personnel information is to be kept confidential.

Award Package for the "Employee of the Quarter"
- The EOQ award will be presented at the following departmental meeting.
- An "Employee of the Quarter" plaque will be presented to the associate.
- The associate's name will be engraved on a brass plate, which will be affixed to the EOQ plaque. The plaque will be displayed in the front lobby area.
- An EOQ certificate will be presented to the associate and a copy placed in the associate's personnel file.
- A letter of appreciation will be presented to the associate and a copy placed in the associate's personnel file.
- A fifty dollar ($50) non-cash gift card to the retail store or other establishment (as available) of their choice will be issued to the associate.
- The associate will have the privilege of parking in the designated "Employee of the Quarter" parking space located at the front of the associate parking area, for the duration of the year.
- The associate will have their choice to attend lunch with their supervisor, Senior Supervisor, Assistant Superintendent, Superintendent or an Officer of the company, whomever they choose.
- The associate's name will be sent within 5 working days to Human Resources for recognition in a CPW news publication.

  Special Note: The Committee Chairperson will be responsible for coordinating the above recognition and awards.

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Employee of the Year:

Eligible Associates:
- All associates who were nominated as Employee of the Quarter through the duration of the year are eligible.
- Associate(s) become ineligible if involved with negligent loss or damage of equipment, or have received a disciplinary action for policy violation.

EOY Selection Process:
- Each associate in the department will be given a ballot sheet listing the eligible associates.
- Departmental associates will mark their selection on the ballot sheet. Voting will be done by secret ballot and tabulated by the EOQ/EOY Committee.
- Voting may occur during a departmental meeting.
- In case of a tie vote, the Superintendent will be asked to cast the deciding vote.

EOQ/EOY Recognition Committee:
    The EOQ/EOY Committee will preside over EOQ/EOY awards. *See section on EOQ.*

Award Package for the "Employee of the Year"
- The EOY award will be presented at the following departmental meeting and/or the Safety and Service Awards luncheon held each year.
- An "Employee of the Year" plaque will be presented to the associate.
- The associate's name will be engraved on a brass plate, which will be affixed to the EOY plaque. The plaque will be displayed in the front lobby area.
- An EOY certificate will be presented to the associate and a copy placed in the associate's personnel file.
- A letter of appreciation will be presented to the associate and a copy placed in the associate's personnel file.
- A one hundred twenty-five dollar ($125) monetary gift will be issued to the associate.
- The associate will have the privilege of parking in the designated "Employee of the Year" parking space, located at the front of the associate parking area, for the duration of the year.
- The associate will have their choice to attend lunch with their supervisor, Senior Supervisor, Assistant Superintendent, Superintendent or an Officer of the company, whomever they choose.
- The associate's name will be sent within 5 working days to Human Resources for recognition in a CPW news publication.
- An "Award Notification Form" must be forwarded to the Accounting Dept. with awards over fifty dollars ($50). Per state and federal compensation laws the associate must be taxed on awards over fifty dollars ($50).

    Special Note: The Committee Chairperson will be responsible for coordinating the above recognition and awards.

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Productivity Management Program (PMP) Awards:

This award is based on monthly cumulative PMP points for the entire department.

<u>Eligible Associates:</u>

All permanent associates in the department receive this award when the department's productivity points from the PMP program exceed 100%.

Part-time or temporary employees who work the entire quarter will also be eligible.

<u>Award Package:</u>

Each associate will receive a non-cash gift card/certificate worth eight dollars ($8).

The individual awards can be combined to finance a department-wide event, i.e., department-wide luncheon, breakfast, baseball game, etc. Each associate will vote on combining the awards prior to final approval. The majority will rule.

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Associate/Crew of the Month Award:

Eligible Associates:

- All associates that measure their level of production through the Productivity Management Program (PMP).
- Associates that accumulate points based on a "team" approach, i.e., designated crew, will be considered one unit.
- In consideration of crewmember shifting, the crew that the associate spent the majority of their time with during the month will be the crew that they are measured with.
- Associate(s) become ineligible if they have received a disciplinary action, i.e., written warning, days off, etc., for policy violation during the month.

Selection Criteria:

- PMP points accumulated by each crew, technician, administrative personnel, etc. will be calculated to establish an average for each month.
- The PMP average for each section will be compared to determine the section winner.
- Section winners will be as follows:
  | Administrative Section (if participating)
  | Construction Section
  | Maintenance Section
  | Pump Station Section
  | Technical Section

- For an associate/crew to win in consecutive months, the associate/crew must exceed their previous month's productivity percentage by 5%.

Award Package:

- ACMA award certificate will be given to the individual or to all associates on a crew.
- The individual or all associates on a crew will receive a ten dollar ($10) non-cash gift card or certificate.

Presentations shall be made monthly at a department gathering: i.e., departmental meeting, skills based training, safety training, etc.

Excellent Performance Award (Spot Award):

Eligible Associates:

All WWCD associates are eligible.

Selection Criteria:
- Supervisory level associates may recommend an associate or crew worthy of recognition directly to the Superintendent or Assistant Superintendent.
- Selection will be made based on the significance of a "job well done", operational improvement suggestion, safety suggestion, project or program implementation, etc.
- The award must be verbally approved by the Superintendent or the Assistant Superintendent, and an Officer of the company.

Award Packages:

Bronze Award:
- This award is given to any associate whose suggestions or performance has impacted the WWCD in a positive manner.
- Justification for the award includes but is not limited to:
  - Going "above the call of duty".
  - Performing job requirements with significant productivity under abnormal circumstances.
  - Implemented safety improvement suggestions.
  - Implemented operational improvement suggestions.
  - Receipt of "letters of recognition" from supervisors, associates, internal or external customers, etc.

- Monetary value range: $10 to $ 49
- Monetary award will consist of non-cash gift cards/certificates.
- Upon evaluation the Superintendent or Assistant Superintendent, and an Officer of the company will determine the actual award value.
- A Bronze Award certificate will be presented to the associate and a copy placed in the associate's personnel file.

Silver Award:
- This award is given to any associate whose suggestions or performance has impacted the WWCD in a highly significant manner.
- Justification for the award includes but is not limited to:
  - Going well "over and above the call of duty".
  - Performing job requirements with significant productivity under abnormal circumstances with a substantial outcome.

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| Implemented safety improvement suggestions with significant operational effects.
| Implemented operational improvement suggestions with a significant outcome.
- Monetary value range: $50 to $99
- Per state and federal compensation laws the associate must be taxed on awards over fifty dollars ($50).
- An "Award Notification Form" must be forwarded to the Accounting Dept. with awards over fifty dollars ($50).

Gold Award:
- This award is given to any associate whose suggestions or performance has impacted the WWCD in a tremendously significant manner.
- Justification for the award includes but is not limited to:
  | Performance, actions, operational suggestions and/or improvements resulting in an extraordinarily significant outcome.
  | Performance, actions, operational suggestions and/or improvements resulting in a significant cost-savings to the department and/or company.
- Monetary value range: $100 to $200
- Per state and federal compensation laws the associate must be taxed on awards over fifty dollars ($50).
- An "Award Notification Form" must be forwarded to the Accounting Dept. with awards over fifty dollars ($50).
- The Superintendent has the authority to alter the monetary value range as appropriate to the operational improvement.

Special Note: An associate can receive a maximum of three hundred dollars ($300) per year in awards.

EMS SUPPLEMENTAL TOOLBOX

GAP ANALYSIS CHECKLIST

Global Environment & Technology Foundation – Gap Analysis Checklist

Gap Analysis
EMS Check List

Answer the following questions. After completing the questions, review the questions for which you answered **No**. These are some of the areas you will pay special attention to when developing your Environmental Management System.

Reference – refer to the ISO 14001 Section that applies and identify and reference the procedures, policies, materials, etc. that you have at your Port that partially or fully meet the EMS (ISO) requirement.

Left to do – activities/actions (e.g., draft the procedure, update a current procedure with additional language, maintain this record, etc.) required to fully implement the EMS requirement.

Responsibility – for identifying and assigning action items to organization personnel who will assist in ensuring the EMS requirement is met.

POLICY	
1. Does your organization have a documented environmental policy?	Yes ☐ No ☐ Partial ☐
Reference:	
Notes:	
2. Does the policy include commitments to a) continual improvements, b) prevention of pollution and c) compliance to relevant laws and other requirements to which the organization subscribes?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

3. Is the policy communicated to all employees and made available to the public?	Yes ☐ No ☐ Partial ☐
How is it made available to all employees? How is it made available to the public?	
Reference:	
Left to do:	
Responsibility:	
Notes:	

4. Has the policy been endorsed and signed by Top Management?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

PLAN

1. Has a procedure to identify the significant environmental aspects of your operations been established and implemented?	Yes ☐ No ☐ Partial ☐
Is the procedure documented?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	

Responsibility:	
Notes:	

2. Has a procedure to identify, track and communicate (to applicable employees) applicable laws and regulations and other requirements to which the organization subscribes been documented, established and implemented?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

3. Have documented environmental objectives and targets been established that:	
• identify responsibilities, schedules and the means by which the objectives and targets will be met	Yes ☐ No ☐ Partial ☐
• take into account the significant environmental aspects, laws, regulations, legal and other requirements and policy commitments	Yes ☐ No ☐ Partial ☐
• consider the views of interested parties	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

DO	
1. Have defined roles, responsibilities and authorities, including the appointment of a specific management representative in charge of the EMS been established?	Yes ☐　　No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	
2. Have sufficient financial, technical and human resources been made available to implement the EMS?	Yes ☐　　No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	
3. Are all employees and contractors aware of the requirement of the EMS, their roles in it, and potential consequences of departure from operating procedures? Are training records maintained?	Yes ☐　　No ☐ Partial ☐ Yes ☐　　No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

4. Has the organization identified training needs and methods for providing general awareness of the EMS to all employees and managers?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

5. Are all employees whose work involves significant environmental aspects competent by training, experience and/or education? Are training records maintained?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

6. Have internal communications procedures regarding EMS issues been established and implemented?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

7. Has the organization established procedures for communicating relevant requirements to suppliers and contractors regarding significant environmental aspects of services?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

8. Has the organization considered procedures for external communication of its significant environmental aspects?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

9. Are the core elements of the EMS documented, including all of the required procedures?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

10. Is there an implemented and documented procedure for managing documents and records to ensure that it is current, accurate and readily retrievable?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

11. Have documented operational controls (e.g., work instructions, maintenance manuals, etc.) for activities associated with significant environmental aspects been developed and implemented?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

12. Have emergency identification, preparedness and response procedures/plans been established, implemented and tested?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

CHECK & ACT	
1. Have procedures been documented and implemented that are associated with significant environmental aspects, operational controls and objectives & targets being monitored and measured?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	
2. Are operations associated with significant environmental aspects, operational controls and performance toward objectives and targets being monitored and measured (e.g., calibration, record reviews, performance observations, trend analyses, etc.)?	Yes ☐ No ☐ Partial ☐
Are relevant records maintained?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	
3. Have procedures for evaluating compliance (e.g., audits, reviews, or inspections) with legal requirements been established and are they being implemented?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

4. Are there procedures in place and being implemented for handing EMS nonconformances and corrective and preventative actions?	Yes ☐ No ☐ Partial ☐
Are records maintained?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

5. Is the information from the monitoring & measuring, auditing programs and training being <u>recorded</u> and reported on a regular basis?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

6. Is there a procedure for EMS audits and is it being implemented?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

MANAGEMENT REVIEW	
1. Is senior management, on a regular basis, reviewing the structure and performance of the EMS to determine the appropriateness and effectiveness of the EMS and identify potential opportunities for improvement?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	
2. Is the management review documented and are management recommendations for continual improvement documented and tracked?	Yes ☐ No ☐ Partial ☐
Reference:	
Left to do:	
Responsibility:	
Notes:	

EMS SUPPLEMENTAL TOOLBOX

EMS SOFTWARE
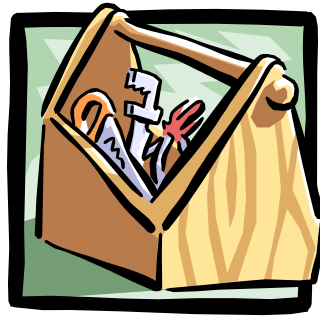
Global Environment and Technology Foundation (GETF) – EMS Software Assessment

Environmental Management System Software

EMS SOFTWARE ASSESSMENT
March 15, 2004

Revised June 23, 2004

Cooperative Agreement # 82886901

Global Environment & Technology Foundation
2900 South Quincy Street, Suite 410 Arlington, VA 22206
(703) 379-2713 Fax: (703) 820-6168

EMS SOFTWARE COMPARISON

As part of the U.S. Environmental Protection Agency (U.S. EPA) and American Association of Port Authorities (AAPA) supported Ports Environmental Management System (EMS) Assistance Project, GETF conducted a neutral analysis of "off the shelf" software products specifically designed to support an organization's development, implementation, and subsequent management of its EMS. The assessment focused primarily on managing environmental issues; however, the analysis also considered the software's capability for integrating quality, environment, security, and safety and health into a single management system approach. An integrated management system approach may be very well suited to the complex, overlapping issues and pressures faced by Ports. While the assessment was conducted specifically with Ports in mind, the assessment may be useful to other public sector businesses and organizations considering the use of software to support their EMS. GETF was specifically selected to conduct this software assessment due to its unique synergy of in-house skills and expertise in both EMS development and technical assistance, and its knowledge of leading information technology applications.

EMS implementers are seeking tools that allow them to efficiently manage EMS implementation and maintenance tasks, such as project scheduling and management, training and training records, documentation management, and internal auditing and corrective/preventative actions. EMS software packages can offer the following key implementation management and EMS maintenance tools:

- Better communication between environmental and project staff at multiple installations
- Easy access to routine environmental and EMS documents and records
- Access to regulations and other requirements; enhanced management of permits, reporting, and compliance
- Database query, reporting, and updating
- Document repositories
- Enhanced project management
- E-mail based notification systems with escalation functions
- Calendar and EMS milestone and progress functions
- EMS report generation tools
- Information access security controls

Assessment Approach

The software assessment entailed collecting factual information via interviews, product demos, message exchanges, and web research on sixteen EMS-focused software products currently available. The products were identified through working knowledge and past experience, colleague referrals, and general research. Each of the identified products were assessed against specific criteria (see evaluation criteria descriptions below) as deemed critical to implementing a viable computer-based management system. Example criteria included: ISO compliance, platform dependencies/adaptability, email notification capability, template provision, licensing requirements, access controls/security features, training, product support, and price. The products were also assessed for manageability of fundamental EMS elements, including: document control features, procedure writing, sample documentation database, environmental aspect and

risk assessment, tracking regulatory compliance, record management, corrective and preventative action, and auditing. Potential users should subsequently ensure a selected product is compatible with the organization's existing IT infrastructure prior to purchasing an EMS software system.

GETF utilized every effort to maintain a neutral disposition and to provide factual information as gathered through product marketing materials, product vendor interviews, and web-based demos. GETF did not have the ability, due to time and logistics, to demo each individual product. Based upon the information collected, GETF subjectively divided the software products into two tiers based on capabilities and specific relevance to the Port EMS Assistance Project. The following is a breakdown of the software products by tier (products are listed alphabetically):

Tier 1
Amadeus Environment Expert eQRP
Entropy International Envoy
Enviance
GreenWare ISO 14000 Implementation Software
GreenWare ISO 14000 Software Suite
IBS America QSI System for Environmental Management
Integrum ISOft 14000
Intelex ISOsoft 14001
Prism Equation
ZMH² EMS-EZ (Graduate research project, included due to potential leveragability)

Tier 2
Dakota Auditor EMS
EMAServer Module ISO 14001 WES
Gage EMSTutor - ISO 14001 Expert System
IsoTop GP ISO 14001 TimeSaver Software
ISYS International ISO 14001 Expert-Ease
Oxegen - Oxegen EMS
Solution Foundry EMSolution Web

Evaluation Criteria Descriptions

Software Functionality

> **Documentation Templates:** Software includes sample document templates (i.e., procedures, policies, manual, etc.) that can be used in the development of an organization's relevant EMS-related documents and/or easily customized to fit the needs of an organization.

> **Document Creation/Integration:** The degree of product flexibility for creating and/or integrating relevant EMS documents into the management system varies greatly. This element is commonly a "sticking point" with products being too prescriptive with regards to document format. Some products are based upon readymade documents/procedures that drive the overall system allowing minimal flexibility on the part of the user, whereby

other products allow a high degree of flexibility with the user able to choose between provided templates, creating documents from scratch, and/or incorporating existing external documents from varying application programs (e.g., Microsoft Word, PDF, etc...).

Document Control/Review Functions: Software includes a document management function, with the ability to track controlled documents, provide a review process, and archive documents. Documents are linked in some format to other relevant components of the EMS (i.e. activities, tasks, responsibilities, training, etc…).

Document Archive/Library: EMS documentation is maintained to accommodate adequate record control and all records and documents are indexed and easily locatable. Many providers offer a library type structure, similar to Microsoft Windows Explorer, with documents linked to relevant activities within the EMS.

Data Compilation and Report Preparation: Software has tools to provide environmental analysis in summaries and graphical reports to determine trends, etc…

Calendar Management: Software has a viewable calendar function to track upcoming EMS implementation and management tasks and deliverables. Products also may have the capability to integrate email notifications/reminders.

Milestone/Task Management and Tracking: Software includes a management tool that produces automatic reminders/notification to individuals and/or groups, such as reminders of projects, tasks, and permit requirements. This function may be linked to calendar management tools.

Regulatory Compliance Management: Compliance management tools to assist with the tracking and compliance of legal and other requirements, including permit deadline reminders, regulatory updates, roles and responsibilities, etc…

Gap Analysis Tool: Software includes a tool that allows an organization to assess their EMS against the ISO 14001 requirements either at the beginning of EMS implementation activities and/or at a specific time of their choosing (e.g., prior to an audit).

Aspect/Impact Analysis Tools: Software has an environmental aspect analysis tool to identify, rank, and prioritize a user organization's most significant environmental impacts.

Audit Component/Tools: Software includes information relative to audit requirements and procedures enabling internal and/or external auditors to verify and document whether the organization's EMS is in conformance with the audit criteria set out in ISO 14010 and 14011. This component may include a comprehensive set of audit procedures, tests, checklists and sample questions, as well as requisite audit documentation and reporting abilities.

Training Management: Software has tools to manage training requirements and training records relevant to environmental management.

Context-specific ISO 14001 Text: Includes ISO 14001 Standard language and direct references to the relevant elements.

Public Entity Clients

Public Entity Clients: Software caters to public entities specifically or as a significant portion of their client base. Public entities have been identified that utilize the software.

Integrated System Capability

Integrated System Capability: Software is designed for integration with other systems, such as quality management, safety and health, etc…

System Architecture

Client Server Solution / Stand-alone PC Version: Software is installed directly on the user's hard-drive and/or hosted internally and purchased through individual licenses.

Web-enabled/Hosted by Provider (ASP): Software can be accessed via web browser, hosted by the software vendor, and does not require software to be installed on individual user's desktops. In addition, web-enabled software is Internet and Intranet capable and platform independent. Software can be linked to other applications and websites to provide up-to-date information.

Database: The software's back-end database and query platform (e.g., Microsoft SQL, Oracle, etc…).

Client Operating System: The different operating systems the software supports (e.g., Windows 98/ME/XP, MS Office, Internet Explorer 5.0 or higher, etc…).

Security Features/Multi-level Access: The software allows for multiple levels of user access, limited by defined roles and responsibilities. The access is determined by an individual user's log-in information. This feature serves two purposes: 1) provides security through limiting access to important information and documents; and 2) simplifies the system by only providing access to information and features (i.e., clears the clutter) necessary to the individual/group user.

Product Cost

Single Desktop License: The software's available cost and options on licensing of their product.

Training: Software includes access to training, either included within the software package or available through a classroom structure. Additional costs are denoted.

Product Support: Technical assistance/product support offered by the software provider as part of the purchase price. Additional costs (i.e., annual support fees) and description denoted. Often this aspect is negotiated and customized at time of purchase.

Unique Software Needs and Characteristics of Public Sectors

Historically, EMS software tools have targeted private sector organizations and corporations; however, several providers have recently focused significant attention on the growing pool of public entity EMS implementers. Due to the initial focus of product development on the private sector, many of the existing products do not meet public sector-specific needs and organizational characteristics (i.e., technological capabilities, scalability to small organizations, operational sectors such as wastewater, etc...). Although an organization's approach to EMS implementation may be similar (i.e., plan-do-check-act, 17 elements of the ISO 14001 Standard, etc...), there are fundamental, organizational differences between public and private sector entities. EMS implementation experience has revealed that the needs, level of requisite support, and capabilities of private versus public sector EMS implementers can vary considerably.

Research and feedback has shown that many existing products, originally created for use in the private sector, are too prescriptive in regards to the structure and implementation of an EMS for use by many public entities. Many of these products are driven by the immediate goal of "achieving ISO certification" as quickly as possible, not a goal necessarily held by public entities. Therefore, many products offer a "cookie-cutter" type approach that strives for turn-key implementation of an EMS. In addition, for an EMS to be successful in driving effective environmental management for public organizations, documents, procedures, policies, and the like must be adaptable to different educational levels and technical capabilities and specific for the site and operational sector (e.g., fleet maintenance) in question. While initially the prescriptive nature of some software is comforting and supportive, overcoming inflexibility in later stages of EMS development and implementation is often extremely time consuming, labor intensive, and counter-productive.

It should also be noted that many public entities implementing EMSs have found that a lot of EMS software packages include many more functions and capabilities than are actually utilized or necessary in practice. The needs of a particular organization can differ widely depending upon organizational size, internal capabilities and resources, and approach to EMS. The central component of a software tool for EMS implementation and maintenance is its ability to control and manage documentation and records. For many organizations this is the sole driver for purchasing an EMS software product, resulting in the organization only utilizing a portion of the software's overall capabilities. In fact, some organizations have realized that all they need is a tool to help manage the documentation and have either developed this in house or hired an external consultant to do so. Therefore, one alternative to consider, dependent upon an organization's specific needs, is to develop or purchase an EMS document management tool.

To our knowledge, the commercial market for such focused products is currently limited with most developed for internal purposes only. GETF was able to demo one such product during this

research, which was produced by the University of Massachusetts – Lowell, a participant in the U.S. EPA-supported 2nd EMS Initiative for Public Entities program. This product is currently being fine-tuned for marketability, but incorporates a very user-friendly interface and capabilities. Additional information on this product can be found at www.uml.edu/epaems.

Public-sector Focused Software
Currently, two EMS software providers have focused significant amounts of time and effort in customizing their products to fit the unique needs of public sector clients, having distinguished themselves, at least for the present time, from other competitors: Greenware (www.greenware.com) and Intelex (www.intelex.com). Both of these products have been procured and utilized by participants in the EMS Initiatives for Public Entities pilot projects and have secured contracts with a larger and more diverse range of public entities than similar competitors. As part of this software comparison effort, GETF participated in software demos and conducted interviews with selected users to assess the components and practical application of both software products.

Overall, both products were of similar quality and scope. Participants in the EMS Initiatives, as well as other relevant GETF clients that have utilized each of these products, have been generally satisfied that the products greatly enhance their ability to implement and manage their respective EMSs. However, a common thread throughout the user feedback has been that the Greenware product does not offer the degree of flexibility with regards to document creation and integration and significant aspect prioritization that was originally desired. Most organizations have learned to accommodate this limitation with resulting success. During the product demo, Greenware representatives expressed that their company is working diligently to increase the flexibility of their product.

Although GETF strived to maintain a neutral assessment of the available EMS software products, it was clear from research and demonstration that Intelex stands out when assessing software effectiveness strictly for public entity EMS use. Other vendors within the Tier 1 listing also offer outstanding management products; however, several expand beyond the scope of EMS, most notably the Amadeus Environment Expert eQRP product. GETF's experience and research clearly identified Intelex as a more user-friendly EMS-specific software package with a simple, straightforward user interface and direct applicability to public entity characteristics and requirements. The Manager's Dashboard, a unique feature to Intelex, was a great overall project management tool and offered a tremendous sense of comfort and control in managing the day-to-day activities of an EMS, a product capability especially valuable to public entity Environmental Management Representatives, as often they are expected to be the lone EMS expert within an organization providing leadership for implementation. In addition, the software maintains format consistency throughout every component, is exceptionally well linked throughout the management system, and offers tremendous, personalized product support. One weakness that was identified in the comparison to other products was that Intelex was among the highest in product cost.

Conclusion
It has become increasingly evident that more and more public entities are interested in software products to better manage their environmental impacts, especially with the implementation and

maintenance of EMSs. This follows a similar trend to that which occurred within the private sector over the last decade. GETF has witnessed this transition firsthand through the current EMS Initiative for Public Entities project in which over half of the participants have purchased or are considering the purchase of EMS-focused software. The Ports, due to the relative complexity of operations and issues as compared to the various public entity sectors, can significantly benefit and essentially implement and maintain more robust EMSs with the assistance of software products.

Software Functionality

1. Document Control

Evaluation Criteria	Amadeus *Environment Expert*	Entropy International *Envoy*	Enviance	GreenWare *ISO 14000 Implementation Software*	GreenWare *ISO 14000 Software Suite*	IBS America *QSI System for Environmental Management*	Integrum *ISOft 14000*	Intelex *ISOsoft 14001*	Prism *Equation*	ZMH² *EMS-EZ*
a. Documentation Templates		Yes, the product includes a variety of ISO 14001 templates (procedures, policies, checklists, etc…)	Yes. The System includes document templates that facilitate preparation of and revisions to required documents.	No, can be purchased separate ($250).	Yes. Procedures can be easily created from scratch, linked to templates, or linked to existing documents (i.e., Word, PDF, etc..)	Yes, the module includes all of the templates and examples needed to create procedures, work instructions, etc…; however, these components are based upon ISO 9000.	Yes, linked to relevant implementation steps of the established plan	Yes, each implementation step is linked to appropriate samples and templates	Yes, best practice templates searchable by key word/topic, including ISO explanations. Also documents can be created with any application software.	This product was developed through the University of South Carolina's Technology Incubator Program. The product was included here due to the potential ability to be modified and adapted to meet Port-specific EMS needs. The product has a minimal initial costs and is currently being examined for commercial viability enhancements. The product was originally developed for the sole purpose of certifying the University to ISO 14001.
b. Document Creation/Integration	Allows you to easily access and view the latest version of each relevant document. Review, approval and distribution sequences are electronically managed. Distribution is instantaneous. Grants access only to documents linked to your duties, personal needs and preferences.	The product allows the user to link to or upload external electronic files, diagrams, and other applications. In addition, the software includes a range of templates.	Yes. The System supports an unlimited number of documents in the Document Manager. These documents may be externally created or created through the Template described above. All documents (files of any type) can be associated with specific components of the user's model.	Documents can be easily created from scratch, linked to templates, or linked to existing documents (i.e., Word, PDF, etc…). Several users have expressed that the product utilizes verbatum ISO language and is at times inflexible with document creation, resulting in longer format documents. Greenware has recently focused upon increasing flexibility.	Documents can be easily created from scratch, linked to templates, or linked to existing documents (i.e., Word, PDF, etc…). Several users have expressed that the product utilizes verbatum ISO language and is at times inflexible with document creation, resulting in longer format documents. Greenware has recently focused upon increasing flexibility.			Yes, users can take advantage of provided templates, create new documents from scratch, or incorporate existing documents in nearly any format.	Document templates are provided in off the shelf Microsoft software and can be used as is or edited appropriately. Documents can be created in any software format used and uploaded or linked to equationASP. Documents can be grouped so that related documents are stored together in folders.	
c. Document Review Process	Yes, document access controlled by user entitlement.	Automatically denotes author, creation date, issue, version number, revision date, and approver. Controlled through the user access and privileges tools	Yes. The System includes a Document Manager	Yes, customizable views for draft, final, etc. Diagnostic features that automatically evaluate completion and status, including a digital signature function and sign off/review checkbox.	Yes, customizable views for draft, final, etc. Diagnostic features that automatically evaluate completion and status, including a digital signature function and sign off/review checkbox.	Yes, revision control and automated document status updates. Includes a temporary storage function for approved but unreleased documents in order to give users the opportunity to train themselves on these documents prior to official release.	Yes, via e-mail system	Yes, document manager creates a list of reviewers, whom are sent an email with the document w/ a link to approve, reject, or edit. Only released revisions are available to general staff w/ built in controls for paper versus electronic distribution. Only document managers can access the advanced document management functions.	Documents are circulated for review and approval via notices that automatically generate emails to those who need to review the document. Reminder and escalation notices help users complete the review on-time. Parallel document approval allows multiple users to review a document at the same time. Approved and rejected votes are recorded online. System automatically remembers who approved the document from its previous version.	
d. Document Archive	Yes, utilizes a data warehouse structure ensuring that records are easily accessible.	Yes, documents are maintained and stored within a central document library.	Yes, the Document Manager function controls and archives previous versions. Documents are associated with the various components of the EMS and controlled through specific security settings.	Yes, via a record registry ensuring proper maintenance for audits.	Yes, via a record registry ensuring proper maintenance for audits.	Yes, each document contains a complete, automatically generated history and is automatically archived.	Yes	Yes, past revisions and revision information are all archived.	equationASP keeps all versions of every document uploaded. Document owners can access the archive while other user only access the current approved versions of documents. Records of approval, changes, etc. are maintained for every version.	
e. Document Library (linked)	All documents are organized in one place through a Windows Explorer-type structure and can be accessed easily and quickly. Documents are linked to keywords, references to other documents and physical locations.	Yes, documents, diagrams, audio/video, and other applications are all linked and stored within a central library, thereby ensuring adequate document control.	Yes, all documents are accessible through a set of folders with an unlimited number of subfolders allowed, with access controlled through security settings.	Yes, aspects (both sign and non-sign) are automatically linked to a relevant series of worksheets. All information entered into the worksheets are linked to the EMS manual, including operational controls and procedures. Structure closely resembles Windows Explorer.	Yes, aspects (both sign and non-sign) are automatically linked to a relevant series of worksheets. All information entered into the worksheets are linked to the EMS manual, including operational controls and procedures. Structure closely resembles Windows Explorer.	Yes, reference module of current documentation indexed via the creation of an EMS Policy Manual and Tier 1 documentation.	Yes, generated docs are linked to various components through a central library.	Yes, controlled per ISO requirement and accessible through an Intranet Index. Documents can also be accessed from outside of the system by utilizing a tool to generate a URL. Reference library linked with ISO Standard descriptions, document samples/templates, PowerPoint Training Courses, and other tools.	The equationASP document library allows users to browse the library to locate documents or search by key word, document owner, revision date, document status, and other criteria about the documents.	Yes

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2. Data Compilation and Report Preparation	Yes, a report generator for extraction, manipulation, and presentation of information related to the EMS. Graphics and statistical tool included.	Yes, users can instantly generate both standard and filtered reports for single, multiple, or all sites	Yes. The System has an ad hoc reporting tool that allows compilation, analysis and reporting of EMS components, compliance data, and records of audits, incidents, accidents, etc, including process time dependent parameters and graphical display formats.	Yes, the product has many reporting/data compilation options, including time/cost (by individual), status, training, corrective action, etc… Exportable to Microsoft Word or HTML.	Yes, the product has many reporting/data compilation options, including time/cost (by individual), status, training, corrective action, etc… Exportable to Microsoft Word or HTML.	Yes, real-time reporting and analysis	Yes, Ad Hoc Reporting tool to create reports and charts from data contained within Integrum and other data sources.	Yes, including compliance (and cost of compliance), significant aspect, monitoring and measurement activities, and general EMS progress reports.	All areas of equationASP offer automatic and customizable reports that show document, corrective action, internal audit, survey, and data collection information. Reports can be viewed on-line, printed, downloaded to Microsoft Excel, and sent to other users as notices / emails.	
3. Calendar Management	Yes, implementation schedule with target dates for activities, tasks, monitoring and measuring, etc..	Yes, create action plans and an implementation schedule, with milestones and task/completion date reminders.	Yes. The System includes a set of calendars organized by user and by EMS component w/ Email reminders of scheduled actions or milestones including a direct link to the task completion page.	Yes, the EMS Calendar provides a summary of all document due dates, tasks and actions, including key monitoring and document review dates. Automatic email responsibility notifications and links to relevant documents.	Yes, the EMS Calendar provides a summary of all document due dates, tasks and actions, including key monitoring and document review dates. Automatic email responsibility notifications and links to relevant documents.	Yes, via an email escalation function. Not clear whether the product has the ability to develop a project implementation plan.	Yes, linked to "to do" lists and responsibility (including regulatory) notification function.	Yes, including a custom implementation plan that creates a step-by-step process for implementation with progress measures and milestones.	The Project Management function provides a pre-defined EMS implementation plan that is customizable for use at the client. The Project Management system schedules all EMS implementation tasks, assigns to teams, and notifies users when action items are due.	
4. Milestone/Task Management and Tracking	Yes, tasks can be assigned to employees via an EMP tree structure, which allows you to see at a glance what stage each EMS is at along with respective objectives, targets, and tasks. Each employee accesses only the information relevant to his/her responsibilities.	Yes, individual sites can be managed with unique users, system access, and responsibilities defined. Roles and responsibilities management tools, including individual, team, and site task lists. Reminder function for completion dates and reviews, including a report function.	Yes, the System's Task Manager allows individual and/or group task assignments. Reminders and escalators are standard and are delivered via email with a link to the task completion page. Tasks are shown in calendars with completion information linked to report functions.	Yes, each user will have an individual calendar listing tasks, activities, due dates, etc… Email notification functions must be manually imputed and are not automatic.	Yes, each user will have an individual calendar listing tasks, activities, due dates, etc… Email notification functions must be manually imputed and are not automatic.	Yes, includes an escalation function to alert management of missed deadlines with message automatically generated and distributed by modules. The product maintains a record of all escalation mail messages for review.	Yes, automatic notifications and task reminders (via email), including a notification calendar and schedule.	Yes, automatic email notification with direct link to activity and relevant documents and customized "task menu" specific to each user. Notification is escalated if task is overdue or pending for a specified amount of time. Operational equipment maintenance activities may also be tracked via email notification.	The Project Management function automatically records the completion of tasks and provides a variety of project status reports that show implementation in Gantt chart form and in terms of on-time vs. late and percent complete.	
5. Regulatory Compliance Management (non-conformance notification)		Yes, compliance management tools (update capacity/assistance unknown) with automatic non-conformance plans and records. Software assists with establishing and maintaining a register of legislation and "anticipating the requirements and impacts of new legislation and standards."	Yes. The System includes automatic data warnings, tasks, follow up (missed deadline or parameter exceedance), and emails to facilitate regulatory compliance. Follow up actions allow classification of the non-conformance into predefined categories such as "Reportable", "Permit Compliance Deviation", "Exempt", etc. Regulatory tracking is also connected to report functions.	Yes, legal and other requirements are linked to relevant aspect worksheets, which is linked to a CD, website, or other source of information. Legal and Other worksheet includes links, responsibility, review date, and future review dates.	Yes, legal and other requirements are linked to relevant aspect worksheets, which is linked to a CD, website, or other source of information. Legal and Other worksheet includes links, responsibility, review date, and future review dates.	Yes, legal register which must be populated by the user with all current environmental regulatory information.	Yes, all applicable requirements must be populated and updated by the user. Software includes a hot-spot link tool for updates, allows electronic documents (i.e. permits) to be incorporated into the system, and critical dates can be entered into the calendar for personnel reminders.	Yes, complete management system ensures compliance to fed, state, and municipal regulations AND other requirements (non-regulatory), but the client is responsible for identifying all applicable regulations. Tracks and delegates action plans for permit compliance. Manages the review, update, and implementation of requirements and tracks associated reporting requirements. Compliance status is displayed through a graphical "Dashboard" by facility, division and department, or organization-wide. Ability to feed in outside update services directly into the EMS software.	equationASP offers tools and worksheets to identify, record, and track legal and other requirements related to the organization. The Improvement System offers ability to enter, administer, assign, and complete nonconformances related to the EMS and notifies all relevant functions.	
6. Gap analysis tool		No, not a specific tool, audit checklist included	Yes, the System includes a predefined report of gaps in the EMS.	Yes, clause-by-clause gap analysis	Yes, clause-by-clause gap analysis	Yes, internal assessment tools for gap analyses and/or internal audits	Yes ISO Navigator tool for users, readers, and auditors	"EMS Status" tool that provides an instant assessment of EMS conformance. Manager's Dashboard allows and instantaneous "snapshot" of the EMS with green and red checks to show status.	equationASP includes a Gap Analysis tool and worksheet to assist in conducting a baselines assessment of the organization and its current status and readiness for an EMS implementation.	

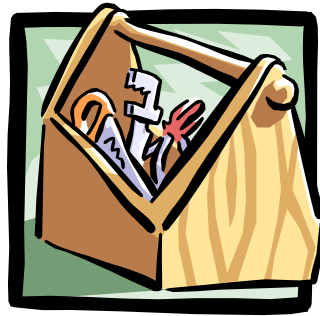| Evaluation Criteria	Amadeus *Environment Expert*	Entropy International *Envoy*	Enviance	GreenWare *ISO 14000 Implementation Software*	GreenWare *ISO 14000 Software Suite*	IBS America *QSI System for Environmental Management*	Integrum *ISOft 14000*	Intelex *ISOsoft 14001*	Prism *Equation*	ZMH² *EMS-EZ*
7. Aspect/Impact Analysis Tools	Yes, software follows the format of aspect identification via activities, O'sT's, and establishment of EMPs. Performance follow-ups and establishment of monitoring and measurement activities. Each aspect connected directly with relevant legal and other requirements, objectives, training, etc...		Yes, the System includes a means to identify, rank, prioritize and re-evaluate environmental impacts. Reporting allows	Yes, each identified aspect is manually linked (via checkbox function) to applicable ISO requirements, documents, reference links, and activities.	Yes, each identified aspect is manually linked (via checkbox function) to applicable ISO requirements, documents, reference links, and activities.	Yes, an EMS Aspects Register.		Yes, an Env. Aspects and Impacts Module steps users through the identification and ranking. The first step is identifying Activities, Products, and Services (APSs). User-defined scoring criteria. Automatic links between ASPs, aspects/impacts, and relevant management components, and subsequently O'sT's and EMPs.	equationASP includes guidance, explanation, tools, and worksheets for identifying, recording, evaluating, and scoring aspects and impacts up front and for the long term.	
8. Audit Tools	Yes, Audit Module organizes an audit schedule enabling the assignment of appropriate resources. Integratable with a CAR Module and an Action Module, which is connected directly to the personnel responsible.	Yes, including audit checklists	Yes, the System includes predefined questions that guide an audit. This pertains to both the development of the EMS and regulatory compliance audits. Audit findings are tracked to closure through automatically created and assigned tasks. Continuous improvement can be evaluated through summary reports D6	No	Yes, ISO 14000 Audit Software for internal and external auditors and ISO 14000 Audit Pro, which includes a set of fully customizable audit protocols, controls and tests, and linked audit report function. Includes graphical representation and percentage of conformance.	Yes, internal assessment tools for gap analyses and/or internal audits. The original ISO 9000-focused product includes a comprehensive audit and corrective action module, but is it unclear whether a similar structure currently exists for the ISO 14000 product.	Yes, including an archived Audit Trail.	Yes, via NCR & C/PAR forms and management tools linked with a complete Audit module.	equationASP includes an Internal Audit system to schedule all EMS audits, assign them to auditors, plan and prepare standard and customized checklists, enter audit reports, and generate corrective actions related to the audits.	
9. Training Management	Yes, ability to identify training needs and management traininig activities for personnel with environmentally-sensitive tasks.	Yes, training needs analysis and management	Yes, the System has a tracking function allowing training schedules, automatic attendance reminders, and training records by subject matter, location, or individual.	Yes, a training worksheet for general and specific training management. Allows a training plan to be developed for each aspect. Does not include automatic training notifications.	Yes, a training worksheet for general and specific training management. Allows a training plan to be developed for each aspect. Does not include automatic training notifications.	Yes, the product is designed to plan, track, and record the training of employees.	Yes, a training database linked to activities, projects, tasks, etc. Notifications and training records included.	Yes, via email notifications and personalized "my training" calendar. Training "work groups" to target employees with similar training requirements. The reference library includes PowerPoint Training Courses and other tools to assist with implementation.	equationASP includes web-based training courses that teach users about the EMS in introductory and intermediate levels of detail. The system automatically records those users who have taken and completed the courses. equationASP also offers the ability to send Training Notices to staff when they require training on the EMS and its documentation.	
10. Context-specific ISO Text	Not specifically based upon ISO 14001. Includes all the elements, but no reference to the standard.	The product supports all activities in the process of implementing and maintaining a management system certifiable to ISO 14001.	Yes. EMS components include ISO specific text.	Yes, interative worksheets address each individual element of the ISO 14001 standard.	Yes, interative worksheets address each individual element of the ISO 14001 standard.		Yes	Each step of the implementation project plan is linked to the ISOsoft reference library and includes in-depth descriptions of the ISO 14001 requirements. Summarizes conformance to all requirements through a real-time, graphical "Dashboard". Terms can be modified to fit the organization.	equationASP breaks the ISO standard into manageable chunks of information and provides easy to read and understand explanation of the requirements. The ISO standard is linked to the topics that need to be addressed throughout the EMS.	Compliant w/ ISO 14001
11. Multi-lingual	Yes, each user can work in his/her own language		System does not currently include languages other than English. Enviance has provided estimates to clients for inclusion of multiple languages in the software package.			Training and implementation services offered in English, Spanish, and French		Yes, PC-based systems are available in Portuguese, Mandarin Chinese, German, Spanish, Italian, and English. Web-based system in French and English w/ a Spanish version under development.		

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Applicability										
1. Ports	Port of Houston Authority		Yes. The System addresses EMS, compliance management, reporting, auditing and training needs of ports.				Yes, non-US			
2. Public Entities (general)		Universities, large government offices, railway system, and District Council	Yes. The System addresses EMS, compliance management, reporting, auditing and training needs of various public entities. Currently, the System is used by Universities, Federal DOE research labs, The National Institutes of health, United States Coast Guard, United States Navy, the National Institute of Standards and Technology, and a county sanitation district.	14 local gov clients listed, including cities, counties, and an airport authority, as well as 40 EPA sites.	14 local gov clients listed, including cities, counties, and an airport authority, as well as 40 EPA sites.	A couple of utilities on the client list, mostly industry/manufacturing	No public entity clients currently. Provided live demos to US Army and PA DOT which were well received, but still under evaluation.	City of Scottsdale, Waterloo Waste Management facility (1st in N.A. ISO registered), York Region Water and Wastewater departments (also 1st in N.A.), and others. City of Charlottesville and Rivanna Sewer and Water Authority (pending).	DoD including Army operations & Chemical Materials Agency, Department of Homeland Security, and others.	
Integrated System										
1. Health and Safety	Yes, as an integratable module	Yes, as an integratable module	Yes. The System can be integrated with Health and Safety data management systems. The System can also be configured to track safety incidents and produce safety	No	No	No	Safety statistics and incident management, linked to CAR. Software complies with British, Australian, and ISO safety management standards.	Yes, via available module	Yes	Yes, the product also integrates occupational health and safety concerns into the overall management system.
2. Quality Control	Yes, as an integratable module	Yes, as an integratable module	Yes. The System can be integrated with quality control data management systems.	No	No	Yes, QSI originally focused upon ISO 9000 Support and leveraged existing products.	Yes	Yes, via available module	Yes, including ISO 9001, ISO 17025, and others (Lean Manufacturing, Continuity of Operations Planning).	
System Architecture										
1. Client Server Solution/Stand-alone PC	Yes	Available Option; additional client server requirements		Available option	Available option	Available	Available	Yes, can be hosted on internal servers via a single installation.	Yes, equationNET can be licensed and installed on client servers.	Yes
2. Web-enabled/Hosted by Provider (ASP)	Web-enabled, implementable in multiple sites.	Available Option, annual subscription	Yes. The System is developed and hosted by Enviance, Inc. and can be installed behind the customer's firewall and hosted internally.	Available option, $1000/site/unlimited users	Available option, $1000/site/unlimited users	Available option, can include remote compliance management	Available option, annual server and software maintenance fee.	Available	Yes, equationASP hosted by Prism and accessed via internet and web browser.	No
3. Database		Microsoft SQL Server 7, 2000, or Oracle 8i	SQL 2000			Oracle, DB2, Lotus Notes, SQL Server, ODBC, et…	Lotus Notes	Oracle and SQL, can be integrated with other existing databases.	Microsoft SQL or Oracle 9i	
4. Client Operating System	Microsoft Office	Windows NT4, 2000, Me, 98, or 95; Internet Explorer 5.0 or higher	Internet Explorer. No software or hardware purchase is needed.	Windows 95, NT, or Higher	Windows 95, NT, or Higher	Windows	Microsoft Windows, preferably NT or 2000+	Microsoft NT and Windows 2000 IIS Server 4 or 5; all major Web Browsers.	Windows 95 or higher.	Windows 98/ME/XP and MS Office
5. Security	Yes	Yes	Yes. Each command and response is fully encrypted using Secure Socket Layer (SSL) 128 bit technology.	Yes	Yes	Yes	Yes, multi-level encrypted code security	Log-in name/password (multi-level access/abilities)	Firewall, VeriSign encryption, user name / password	
6. Security Features/Multi-level Access/Authority	Yes, the Document Management module grants access only to the information necessary for an individual employee or defined group.	Yes, individual user access and privilege controls	Yes. Various authorization levels are included for both users and groups. Authorizations and permissions can be set at the individual EMS component/data element level, if desired.	Yes, user right settings and controlled access to the system w/ several levels of user controls including "read only".	Yes, user right settings and controlled access to the system w/ several levels of user controls including "read only".	Yes	Yes, multi-level encrypted code security, including selective information distribution to contractors, suppliers, and the public.	Yes, including "levels of viewing authority" and customized security group settings. These functions are fully controlled and applied by the system administrator. Access and data management may be based upon an organization's structural hierarchies.	All areas of equationASP including documents, corrective actions, audits, and other data can be made accessible to all user or security can be applied to designate which users have access to different documents and functions.	

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Cost										
Note: Costs are dependent upon the specific needs of individual clients, as the majority of products are scalable in several variables. This assessment has attempted to provide a "ballpark" comparison.										
1. Single Desktop License	Client may select requisite modules and pay only for them.		Pricing available upon request by calling 1-866-Enviance	$1,399 ($700/user 2-9) ($350/user 10+)	$2,479 ($1,239/user 2-9) ($619/user 10+)	Contact was unable to provide cost information, since their systems are customized to fit the needs of individual clients.	$995	Price varies from approx. $2,000 up. Product is purchased by individual module with the full package (quality, safety/health, etc..) approximately $8,000. Product is customized for client organization structure.	Typical format is annual subscription for designated number of staff / users, price starts at $5k annually for up to 15 users and increases incrementally for additional blocks of users with the price per user going down as more users are added.	$617/license
2. Training		Customized training solutions delivered via the Internet	First day included in license. Additional days at $1,200/day for up to 10 participants.	1-day $250/participant; 2-day $350/participant	1-day $250; 2-day $350; Auditor training $350 (All per participant)	Includes a EMS Advisor module that offers guidance for development, implementation, and checking of the EMS. Various training options available.	On-line training database available 24hrs/day at $245/user	Intelex provides a Installation and Administration Guide and the ISOsoft User Manual. Additional training may be customized and provided for an extra cost.	equationASP includes web-based training courses that teach users how to use the system. Live training can be provided on-site and/or remotely via on-line meetings and phone and can be provided in daily or hourly formats. Most users only need a few hours of training to use the system effectively.	No
3. Product Support		Yes, support and upgrades. Additional price?	Yes. Included in license cost.	25%	25%	Yes, via annual maintenance contract. Telephone support M-F, access to technical website 24 hours per day.	Yes, product support (email and phone) and upgrades are included in the annual support fee.	Annual support and maintenance contract, utilizing mutually agreed upon issue severity levels.	Phone and email customer support, on-line Help system, and quarterly upgrades, are included in subscription / license fees.	No
Additional Information										
1. Website Address	http://amadeus-csi.com/solutions/eQRPEnvironment.asp	http://www.entropy-international.com/home/products/environmental-management.asp	www.enviance.com	http://greenware.ca/software/iso2.html	http://greenware.ca/software/iso2.html	http://www.qualitysys.com/website/website.nsf/0/8c66deb4c9e6fe7d852568c10053ea0a?OpenDocument	http://www.isoft14000.com/display.asp?pageID=2	http://www.intelex.com/isosoft14001index.htm	www.prismesolutions.com	http://incubator.research.sc.edu/
2. Available Demo	Yes, via Internet/phone combo. Regularly scheduled public demos every	Yes	Yes. With teleconference and via web.	Yes, self-guided	Yes, self-guided	Available, including a free analysis of an organization's software needs.	Yes, online w/ conference call	Yes, via web conference.	Yes, on-line at www.prismesolutions.com or guided demos upon request.	
3. Location of Headquarters	Europe and Canada	UK	Carlsbad, CA	Berkeley, CA and Toronto, Ontario	Berkeley, CA and Toronto, Ontario	Lexington, MA	Australian product, Trinity Consultants is a North American (Dallas, TX) reseller	Toronto, Ontario	King of Prussia, PA 888-386-2330	Columbia, SC
Special Notes										
		Based upon Plan-Do-Check-Act model with a very similar breakdown of activities as GETF's model.	Cost includes product upgrades which are delivered seamlessly with no actions required by customer. Enviance is used by numerous public entities and industrial customers. Annual user conference is held.	Utilized by a Muni II participant (Tri-Met) and recently purchased by Muni III participants (Kent County and Metro Waste)	Utilized by a Muni II participant (Tri-Met) and recently purchased by Muni III participants (Kent County and Metro Waste)		The product has been used by single site operations to large corporations; however, a desktop product called ISOmate is also available with essentially the same functionality.	Utilized by a Muni I Participant (Scottsdale), very good/responsive product support. Easy to navigate, Manager's Dashboard very useful for EMR.	Call Mike Reeve at 603-763-4791 or email at mreeve@prismesolutions.com.	Created through the University of South Carolina Columbia Technology Incubator (USCTI) business incubator program.

EMS SUPPLEMENTAL TOOLBOX

COMPLIANCE CHECKLIST

City of Gastonia WWTP – Compliance Sampling/Evaluation Checklist

COMPLIANCE SAMPLING/EVALUATION INSPECTION

WWTP: PERMIT NO.

INSPECTORS:

PERSONS INTERVIEWED:

DATE:

ENTER TIME:

PERMIT:

VERIFY NAME OF PERMITTEE, ADDRESS, TITLE, PHONE NUMBER	YES ☐	NO ☐
COMPARE FACILITY DESCRIPTION WITH ACTUAL	YES ☐	NO ☐
ARE ALL PROCESS UNITS BEING OPERATED?	YES ☐	NO ☐

_____

_____

_____

DOES PERMIT EXPIRE SOON?	YES ☐	NO ☐

EXPIRATION DATE:

ORC:

IS CERTIFICATION OF ORC ADEQUATE?	YES ☐	NO ☐
IS ORC VISITING FACILITY AS REQUIRED?	YES ☐	NO ☐

WHO IS DESIGNATED BACK-UP?

RECORDS / REPORTS:

ARE SELF-MONITORING RECORDS MAINTAINED ON SITE AND AVAILABLE?	YES ☐	NO ☐
DISCREPANCIES?	YES ☐	NO ☐
IS ORC LOG MAINTAINED?	YES ☐	NO ☐
ARE WHO, WHAT, WHERE, WHEN OF SAMPLING LISTED IN LOG?	YES ☐	NO ☐

ARE INSTRUMENT CALIBRATION RECORDS MAINTAINED?   YES ☐   NO ☐

ARE PH METERS CALIBRATED DAILY?   YES ☐   NO ☐

ARE 3 BUFFERS USED?   YES ☐   NO ☐

IS SLOPE LISTED?   YES ☐   NO ☐

ARE BUFFERS DATED WHEN REC'D?   YES ☐   NO ☐

ARE BUFFERS DATED WHEN OPENED?   YES ☐   NO ☐

ARE DO METERS CALIBRATED DAILY?   YES ☐   NO ☐

IS CL TITRATOR CALIBRATED DAILY?   YES ☐   NO ☐

ARE ALL THERMOMETERS AND METERS CALIBRATED BY A
NIST TRACEABLE CERTIFIED THERMOMETER?

    PH METER THERMOMETER?   YES ☐   NO ☐

    INFLUENT COMPOSITE SAMPLER ?   YES ☐   NO ☐
    TEMPERATURE: LAST CALIBRATION DATE:

    EFFLUENT COMPOSITE SAMPLER?   YES ☐   NO ☐
    TEMPERATURE: LAST CALIBRATION DATE:

ARE MAINTENANCE RECORDS KEPT?   YES ☐   NO ☐

FACILITY SITE REVIEW:

EVALUATE PROCESS UNITS.

EVERYTHING OPERATING PROPERLY?   YES ☐   NO ☐

SYMPTOMS THAT SUGGEST PROBLEMS:

SITE WELL MAINTAINED: YES ☐   NO ☐

GRASS MOWED, ACCESS ROAD MAINTAINED?   YES ☐   NO ☐

DISCUSS ANY SLUDGE WASTING

ARE CHEMICALS / OPERATING PROC. USED AS "BANDAID"
SOLUTIONS OR TO ENHANCE TREATMENT?   YES ☐   NO ☐

EXPLAIN:

ARE SCREENINGS / GRIT CONTAINED AND DISPOSED OF?   YES ☐   NO ☐

WHERE DISPOSED?

IS ROUTINE MAINENANCE APPARENT?   YES ☐   NO ☐

FLOW MEASUREMENT:

IS MEASURMENT METHOD CONSISTENT WITH PERMIT
REQUIREMENTS?   YES ☐   NO ☐

IS A NON-CALIBRATED FLOW MEASURING DEVICE USED?   YES ☐   NO ☐

IF RECORDING FLOW METER IS USED, IS RECORDER WORKING?   YES ☐   NO ☐

DETERMINE FREQUENCY OF CALIBRATION AND BY WHOM:

IS COMPOSITE SAMPLER FLOW PROPORTIONAL?   YES ☐   NO ☐

LABORATORY:

ANY ANALYTICAL TEST PERFORMED REQUIRING CERTIFICATION? YES ☐   NO ☐

ANY PARAMETERS CONTRACTED OUT?   YES ☐   NO ☐

LIST:

LAB CERTIFICATION NUMBERS AND EXPIRATION DATES:

SPOT CHECK INSTRUMENT / EQUIPMENT CALIBRATION AND RECORDS:
pH Meters ☐

Thermometer Calibration ☐

EFFLUENT / RECEIVING WATERS:

IMPACT OF EFFLUENT ON RECEIVING STREAM:

DOES EFFLUENT HAVE VISIBLE SOLIDS?   YES ☐   NO ☐

FOAMY OR HIGHLY COLORED?   YES ☐   NO ☐

IS UPSTREAM CLEAR?   YES ☐   NO ☐

HOW FAR DOWNSTREAM DOES MIXING OCCUR?

ARE UPSTREAM AND DOWNSTREAM COLLECTIONS CORRECT?   YES ☐   NO ☐

COMPLIANCE SCHEDULES:

IS FACILITY OPERATING UNDER SOC/JOC?   YES ☐   NO ☐

WHICH PARAMETERS ARE AFFECTED BY INTERIM LIMITS?

DISCUSS VIOLATIONS OF SOC/JOC SCHEDULED ACTIVITIES:

SELF-MONITORING PROGRAMS:

IDENTIFY NONCOMPLIANCE WITH PERMIT/SOC/JOC LIMITS:

ANY NOVS RECEIVED?   YES ☐   NO ☐

ARE MONITORING FREQUENCIES MAINTAINED?   YES ☐   NO ☐

ARE DMR'S CORRECTLY COMPLETED?   YES ☐   NO ☐

REVIEW SAMPLE COLLECTION, PRESERVATION, TRANSPORTATION:

ARE HOLDING TIMES CORRECT (6 HOUR FECAL)   YES ☐   NO ☐

IF MONITORING IS PERFORMED AT A GREATER THAN REQUIRED
FREQUENCY, IS ALL DATA REPORTED?   YES ☐   NO ☐

OPERATIONS AND MAINTENANCE:

ESTABLISHED PREVENTATIVE/CORRECTIVE MAINTENANCE   YES ☐   NO ☐
PROGRAM?

IS STAFFING ADEQUATE?   YES ☐   NO ☐

ESTABLISHED PROCESS CONTROL PROGRAM?   YES ☐   NO ☐

ARE ALL SAMPLE JUGS AND BOTTLES CLEANED DAILY?   YES ☐   NO ☐

ARE SAMPLES PRESERVED APPROPRIATELY?   YES ☐   NO ☐

SLUDGE DISPOSAL:

INVESTIGATE SLUDGE HANDLING AND DISPOSAL, INCLUDING SITE
OF ULTIMATE DISPOSAL.

ARE ANY PERMITS REQUIRED?	YES ☐	NO ☐
DO THEY HAVE THEM?	YES ☐	NO ☐
IS ANY MONITORING REQUIRED?	YES ☐	NO ☐
ANNUAL REPORTS REQUIRED?	YES ☐	NO ☐
IS DIVISION RECEIVING THEM?	YES ☐	NO ☐
SITE OF DISPOSAL CONSISTENT WITH PERMIT?	YES ☐	NO ☐

OTHER QUESTIONS / NOTES:

EMS SUPPLEMENTAL TOOLBOX

TRAINING

City of Gastonia WWTP – EMS Training Matrix (partial)
City of San Diego WWC – EMS Training Matrix
City of San Diego WWC – Safety and Training Report Template

Training Matrix for EMS Management Procedures

Controlled Version on Computer U: Drive - All printed copies are uncontrolled

EMS Chart #: EMS-0102.005B
Format Revision #: 2
Date Format Updated: 8/4/03
Date Printed: 8/20/2004

Crowders Creek Laboratory Procedures				Steve Oakley		Susan Copeland		Phil Hazelwood		Jason Hunnicutt		Sandra Herron		Rocio Bell		Stephanie Scheringer	
Document Title	Document #	Rev	Revision Date	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient
Chemical Hygiene Plan	WCR-0100.100	3	05/20/02	NR	NR	06/06/02	06/06/02	06/06/02	06/06/02	06/06/02	06/06/02	06/06/02	06/06/02	10/31/02	10/31/02	06/07/02	06/07/02
Quality Assurance Manual	WCR-0100.102	5	10/21/03	NR	NR	11/05/03	11/06/03	11/05/03	11/06/03	11/05/03	11/06/03	11/05/03	11/06/03	11/05/03	11/06/03	11/05/03	11/06/03
Laboratory Checks and Calibrations	WCR-0100.103	4	06/09/03	NR	NR	06/10/03	06/11/03	06/10/03	06/11/03	06/12/03	06/12/03	06/10/03	06/11/03	06/11/03	06/11/03	NR	NR
Washing and Preparation of Glassware and Bottles	WCR-0100.104	3	09/27/02	NR	NR	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	11/06/02	11/06/02	NR	NR
Sample Bottle Preparation & Allocation	WCR-0100.105	7	10/21/03	NR	NR	10/23/03	10/23/03	10/27/03	10/27/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	NR	NR
Data Verification	WCR-0100.106	4	03/12/04	NR	NR	10/17/03	10/17/03	10/17/03	10/17/03	10/17/03	10/17/03	10/17/03	10/17/03	10/17/03	10/17/03	10/17/03	10/17/03
Mercury Spill Clean Up Procedure	WCR-0100.108	1	02/21/01	NR	NR	03/27/01	03/27/01	03/28/01	03/28/01	03/27/01	03/27/01	03/28/01	03/28/01	11/01/02	11/01/02	03/28/01	03/28/01
Inorganic Acid & Base Spill Clean Up Procedure	WCR-0100.109	1	02/21/01	NR	NR	03/27/01	03/27/01	03/28/01	03/28/01	03/27/01	03/27/01	03/28/01	03/28/01	11/01/02	11/01/02	03/28/01	03/28/01
Laboratory Waste Chemical Storage/Disaposal	WCR-0100.110	3	07/10/01	NR	NR	11/14/01	11/14/01	11/14/01	11/14/01	11/14/01	11/14/01	11/14/01	11/14/01	11/06/02	11/06/02	11/14/01	11/14/01
Sample Receiving	WCR-0100.111	6	10/21/03	NR	NR	10/23/03	10/23/03	10/27/03	10/27/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	NR	NR
Switching Temperature Control Units on Environmental Rooms at Crowders Laboratory	WCR-0100.112	5	02/12/03	NR	NR	02/14/03	02/14/03	02/13/03	02/13/03	02/14/03	02/14/03	02/13/03	02/13/03	02/18/03	02/18/03	02/14/03	02/14/03
Procedures for Changing Set-point - Room Too Warm	WCR-0100.112A	4	02/12/03	NR	NR	02/14/03	02/14/03	02/13/03	02/13/03	02/14/03	02/14/03	02/13/03	02/13/03	02/18/03	02/18/03	02/14/03	02/14/03
Procedures for Changing Set-point - Room Too Cold	WCR-0100.112B	4	02/12/03	NR	NR	02/14/03	02/14/03	02/13/03	02/13/03	02/14/03	02/14/03	02/13/03	02/13/03	02/18/03	02/18/03	02/14/03	02/14/03
Weekend Work Scheduling for Laboratory Technicians	WCR-0100.113	1	05/18/01	NR	NR	06/06/01	06/06/01	06/06/01	06/06/01	06/06/01	06/06/01	06/06/01	06/06/01	11/01/02	11/01/02	06/14/01	06/14/01
Microscopic Observation	WCR-0100.114	1	04/15/03	NR	NR												
Conductivity Analysis- Orion Conductivity Meter Model 128	WCR-0100.118	1	04/09/03	NR	NR	11/13/03	11/13/03	04/11/03	04/11/03	NR	NR					04/11/03	04/11/03
Alkalinity Analysis	WCR-0100.121	3	02/03/03	NR	NR	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	NR	NR
Ammonia-Nitrogen Analysis	WCR-0100.122	8	10/21/03	NR	NR	10/23/03	10/23/03	10/27/03	10/27/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	NR	NR
Ammonia-Nitrogen Analysis by Orion 720A Meter	WCR-0100.122A	3	10/21/03	NR	NR	10/23/03	10/23/03	10/27/03	10/27/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	NR	NR
Ammonia Nitrogen Distillation Method	WCR-0100.123	5	10/21/03	NR	NR	10/23/03	10/23/03	10/27/03	10/27/03			10/23/03	10/23/03	10/23/03	10/23/03	NR	NR
Automated Biochemical Oxygen Demand Analysis	WCR-0100.124A	5	09/24/03	NR	NR	09/26/03	09/26/03	10/01/03	10/01/03	09/26/03	09/26/03	09/26/03	09/26/03	09/26/03	09/26/03	NR	NR
Biochemical Oxygen Demand Analysis - Manual Method	WCR-0100.124B	2	01/22/03	NR	NR	01/24/03	01/24/03	01/24/03	01/24/03	01/24/03	01/24/03	01/24/03	01/24/03	02/21/03	02/21/03	NR	NR
Chemical Oxygen Demand Analysis	WCR-0100.125	3	05/13/03	NR	NR	05/15/03	05/15/03	05/15/03	05/15/03	05/15/03	05/15/03	05/15/03	05/15/03	01/20/04	02/13/04	NR	NR
Chemical Oxygen Demand Analysis (Using Shimadzu Spectrophotometer)	WCR-0100.125B	3	05/14/03	NR	NR	05/15/03	05/15/03	05/15/03	05/15/03	05/15/03	05/15/03	05/15/03	05/15/03	01/20/04	02/13/04	NR	NR
Total Cyanide Analysis	WCR-0100.127	0	04/07/03	NR	NR	11/05/03	12/17/03			04/21/03	04/21/03			04/07/03	04/16/03	NR	NR
Fecal Coliform Analysis	WCR-0100.128	10	02/25/04	NR	NR	03/10/04	03/10/04	03/10/04	03/10/04	NR	NR	03/10/04	03/10/04	03/10/04	03/10/04	NR	NR
Metals Analysis by ICP-MS	WCR-0100.130	5	12/05/03	NR	NR											NR	NR
Mercury Analysis - Water Bath Digestion Method	WCR-0100.131	5	02/21/03	NR	NR	NR	NR									NR	NR
Mercury Analysis - Hot Block Digestion Method	WCR-0100.131A	3	02/21/03	NR	NR	NR	NR									NR	NR

1. Shaded area indicates training is required.   2. Date is date most recent documented training on that revision was received.
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Training Matrix for EMS Management Procedures

Controlled Version on Computer U: Drive - All printed copies are uncontrolled

EMS Chart #: EMS-0102.005B
Format Revision #: 2
Date Format Updated: 8/4/03
Date Printed: 8/20/2004

Crowders Creek Laboratory Procedures				Steve Oakley		Susan Copeland		Phil Hazelwood		Jason Hunnicutt		Sandra Herron		Rocio Bell		Stephanie Scheringer	
Document Title	Document #	Rev	Revision Date	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient	Training	Training Sufficient
Metals Hot Block Digestion Procedure	WCR-0100.132	2	11/13/02	NR	NR											NR	NR
Metals Microwave Digestion Procedure	WCR-0100.133	2	12/05/03	NR	NR											NR	NR
Nitrates Analysis	WCR-0100.134	3	11/06/01	NR	NR	04/23/01	04/23/01	04/23/01	04/23/01	04/19/01	04/19/01	04/23/01	04/23/01			04/24/01	04/24/01
Nitrate & Nitrite Analysis - FIAS Method	WCR-0100.136	0	11/26/02	NR	NR	11/26/02	11/26/02									NR	NR
pH Analysis	WCR-0100.137	4	12/31/02	NR	NR	01/02/03	01/03/03	01/02/03	01/03/03	01/07/03	01/07/03	01/02/03	01/03/03	01/06/03	01/06/03	NR	NR
Ortho Phosphorus	WCR-0100.138	5	02/20/03	NR	NR	08/19/02	08/19/02	08/19/02	08/19/02	08/16/02	08/16/02	08/16/02	08/16/02			12/03/02	12/03/02
Total Phosphorus Analysis	WCR-0100.139	8	02/19/03	NR	NR	01/09/03	01/09/03	NR	NR	01/09/03	01/09/03	01/09/03	01/09/03			NR	NR
Residual Chlorine Analysis	WCR-0100.140	5	02/19/03	NR	NR	02/20/03	02/20/03	02/20/03	02/20/03	02/20/03	02/20/03			02/20/03	02/20/03	02/19/03	02/19/03
40 Day Vector Attraction Analysis	WCR-0100.141	3	08/04/03	NR	NR											NR	NR
Solids - % Total Solids/% Total Volatile Solids Analysis	WCR-0100.143	6	08/04/03	NR	NR	08/04/03	08/04/03	08/04/03	08/04/03	08/04/03	08/04/03	08/04/03	08/04/03			NR	NR
Solids – Total Solids/Total Volatile Solids Analysis	WCR-0100.144	4	08/04/03	NR	NR	08/04/03	08/04/03	08/04/03	08/04/03	08/04/03	08/04/03	08/04/03	08/04/03			NR	NR
Total Suspended/Total Volatile Suspended Solids Analysis	WCR-0100.145	5	09/18/03	NR	NR	09/26/03	09/29/03	09/26/03	09/29/03	09/26/03	09/29/03	09/26/03	09/29/03	09/26/03	09/29/03	09/26/03	09/29/03
Total Kjeldahl Nitrogen Analysis	WCR-0100.146	5	12/31/03	NR	NR	01/02/04	01/02/04	01/13/04	01/13/04	01/02/04	01/02/04					NR	NR
Volatile Acids Analysis	WCR-0100.147	3	02/03/03	NR	NR	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	02/04/03	NR	NR
ADMI Color Analysis	WCR-0100.150	8	02/20/03	NR	NR	08/27/02	08/27/02	08/27/02	08/27/02	08/28/02	08/28/02	08/28/02	08/28/02	11/14/02	11/14/02	08/28/02	08/28/02
Clean Hood Operation	WCR-0100.153	3	11/14/01	NR	NR	08/19/02	08/19/02									NR	NR

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Figure 2
Wastewater Collection Occupational Catergories

WWC

WASTEWATER COLLECTION OCCUPATIONAL CATEGORIES

Revision April 2003

ML = Mandated By law
DR = Department Required

					New TIMS Occupational Categories	MW101266 Emergency Preparedness	MW800211 Environmentally Sensitive Lands	MW101335 Hazard Communication	ES9*HR01 HAZMAT for Handlers - 8 Hrs.	ES9*HR01 Hazmat for Handlers - 4 Hr. Review	ES9*SR01 Hazmat Handlers for Supervisors	MW102002 Herbicide and Pecticide Safety	MW101134 Injury and Illness Prevention	MW14001A ISO Awareness	MW1*SEMS Stand. Emerg. Man. System (S.E.M.S.)	MW800200 Storm Water Pollution Prevention
					TRAINING HOURS	1	2	1	8	4	4	2	1	1	1	1
					FREQUENCY	0	0	0	0	1	1	1	0	1	0	0
3	0	0	5	5	Administration - Non-Supervisory	ML		ML					ML	DR	ML	ML
3	0	0	8	0	Administration - Supervisory	ML		ML					ML	DR	ML	ML
3	0	1	9	0	Equipment Operation, W/O Confined Space	ML		ML					ML	DR	ML	ML
3	0	1	9	2	Equipment Operation, W/ Confined Space	ML		ML					ML	DR	ML	ML
3	0	1	7	5	Equipment Technician I, II, III W/Confined Space	ML		ML					ML	DR	ML	ML
3	0	1	8	0	Equipment Technician I, II, III W/O Confined Space	ML		ML					ML	DR	ML	ML
3	0	2	3	0	Engineering - Non-Supervisory (FEWD)	ML		ML					ML	DR	ML	ML
3	0	2	4	0	Engineering - Supervisory (FEWD)	ML		ML					ML	DR	ML	ML
3	0	2	1	0	Engineering - Non-Supervisory (Non-FEWD)	ML		ML					ML	DR	ML	ML
3	0	2	2	0	Engineering - Supervisory (Non-FEWD)	ML		ML					ML	DR	ML	ML
3	0	2	5	5	Plant Process Control Electrician W/Conf. Space	ML		ML					ML	DR	ML	ML
3	0	2	5	0	Plant Process Contr. Electrician W/O Conf. Space	ML		ML					ML	DR	ML	ML
3	0	3	5	0	Plant Process Control - Supervisory	ML		ML					ML	DR	ML	ML
3	0	1	9	5	Utilities - Non-Supervisory W/ Confined Space	ML		ML					ML	DR	ML	ML
3	0	3	0	0	Utilities - Non-Supervisory W/ Confined Space (NROW)	ML		ML				ML	ML	DR	ML	ML
3	0	2	9	0	Utilities - Non-Supervisory W/O Confined Space	ML		ML					ML	DR	ML	ML
3	0	2	9	5	Utilities - Non-Supervisory W/O Confined Space (NROW)	ML		ML				ML	ML	DR	ML	ML
3	0	1	8	5	Utilities - Supervisory W/ Confined Space	ML		ML					ML	DR	ML	ML
3	0	1	7	0	Utilities - Supervisory W/O Confined Space	ML		ML					ML	DR	ML	ML

MWWD Course Numbers

Frequency

0 = One Time Training

5 = Repeat every 5 years

SAFETY AND TRAINING REPORT
*TAILGATE

DATE OF TRAINING _____ **LOCATION** _____ **PTL PS1 PS2 PS64 PS65 PENA EMG DRISC**

SAFETY TOPIC PRESENTED_____

REFERENCE MATERIAL USED IN PREPARATION FOR THIS PRESENTATION :_____

INSTRUCTOR _____ **EMP ID#:**_____

Name of each person in attendance

LAST NAME (PRINT)	SIGNATURE	EMP ID#	LAST NAME (PRINT)	SIGNATURE	EMP ID#

ELAPSED TIME OF PRESENTATION   NUMBER IN ATTENDANCE   TOTAL TRAINING HOURS

_____   X   _____   =   _____

IMPORTANT: ORIGINAL – DEPARTMENT TRAINING SUPERVISOR, MS 901A/MOC 2
                COPY - RETAINED BY SENIOR SUPERVISOR SUBJECT TO CAL-OSHA AUDIT

EMS SUPPLEMENTAL TOOLBOX

EMS INTERNAL AUDIT

City of Gastonia WWTP – Internal EMS Audit Checklist
City of Gastonia WWTP – Internal EMS Audit Plan Worksheet
City of Gastonia WWTP – Internal EMS Audit Report Template

Public Works and Utilities Department
Internal EMS Audit
Checklist

Audited Section: _____   Division: _____

Scheduled Audit Date: _____   Audit Location: _____

Lead Auditor: _____

Auditors: _____

_____

Auditors in Training: _____

Pre-Audit Planning Meeting

Date: _____   Time: _____   Location: _____

Attendees: _____

Comments

Pre-Audit Talk with Section Supervisor

Supervisor: _____

Date: _____   Time: _____

Comments: _____

Audit

Start Date: _____

Finish Date: _____

Comments: _____

C/PARs Generated

By: _____   Date: _____

C/PARs #s: _____

Comments: _____

C/PARs Returned

Date: _____

Written by: _____

Comments: _____

Report Completed

Date: _____

Written by: _____

Comments: _____

Completed Audit Report given to EMS Coordinator

By: _____   Date: _____

Internal EMS Audit
Audit Plan Worksheet

Scheduled Audit Date:	Audit Location:

Auditors:

Primary Procedure/Document? ☐ No   ☐ Yes   (If yes, the following information is required.)

Document Name: _____   Owner: _____

Document ID: _____   Revision #: _____

Pre-Audit Preparation

Support Documentation Reviewed:

_____   _____

_____   _____

_____   _____

Follow-up Issues from previous audits:

_____

_____

_____

_____

_____

Audit Plan

Positions to Interview:

_____

_____

☐   Item/Issue: _____

    Notes: _____

    _____

☐   Item/Issue: _____

    Notes: _____

    _____

☐   Item/Issue: _____

    Notes: _____

Form #: EMS-0101.011B
Effective Date: 2-14-2001
Revision Date: 2-14-2001
Revision #: 0

Record ID #: EMS-0101.011B-_____-_____
Corresponding Procedure: EMS-0100.011

Page 1 of 2

Internal EMS Audit
Audit Plan Worksheet
(continued)

Scheduled Audit Date: _____ Audit Location: _____

Audit Plan

☐ Item/Issue: _____

Notes: _____

_____

☐ Item/Issue: _____

Notes: _____

_____

☐ Item/Issue: _____

Notes: _____

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☐ Item/Issue: _____

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☐ Item/Issue: _____

Notes: _____

_____

☐ Item/Issue: _____

Notes: _____

_____

ENVIRONMENTAL MANAGEMENT SYSTEM
Internal Audit Report

Audit Date: **Section(s) Audited:**
Supervisor/Contact:
Auditors:

The following is a detailed internal audit report as required and defined by procedure
EMS-0100.0011 of the City's Environmental Management System.

I.   **Environmental Policy:** ☐ In Conformance   ☐ Not in conformance ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

II.   **Environmental Aspects:** ☐ In Conformance   ☐ Not in conformance ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

III.   **Critical Control Points:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

IV.   **Legal &Other Requirements:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

V.   **Objectives and Targets:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

VI.   **Structure and Responsibility:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

VII.   **Training, Awareness, Competence:** ☐In Conformance ☐Not in conformance ☐Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

VIII. **Communication Programs:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

IX. **Public Participation:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

X. **EMS Documentation:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

XI. **Document Control:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

XII. **Operational Control:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

XIII. **Emergency Preparedness Response:** ☐In Conformance ☐Not in conformance ☐Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

XIV. **Monitoring and Measurement:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

XV. **Corrective/Preventative Action Program:** ☐In Conformance ☐Not in conformance ☐Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

XVI. **Records:** ☐ In Conformance   ☐ Not in conformance   ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

XVII. **EMS Audit Program:** ☐ In Conformance   ☐ Not in conformance ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

XVIII. **Biosolids Performance Report:** ☐ In Conformance   ☐ Not in conformance
☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

XIX. **Management Review – ISO 14001:** ☐ In Conformance ☐ Not in conformance ☐ Not Audited
Findings-C/PAR#s:
Opportunities for Improvements:
Comments:

Auditor Signature_____Date_____

Auditor Signature_____Date_____

Auditor Signature_____Date_____

Appendix C

Additional Sources of Information

Provided EMS Support to Wastewater Facilities

USEPA	www.epa.gov and www.epa.gov/owm/sectmis.htm
Cal-EPA	www.calepa.ca.gov/
Water Environment Federation (WEF)	www.wef.org/
Association of Metropolitan Sewerage Agencies (AMSA)	www.amsa-cleanwater.org/
Delaware Department of Natural Resources and Environmental Control (DNREC)	www.dnrec.state.de.us/dnrec2000/
North Carolina Division of Pollution Prevention and Environmental Assistance (NC DPPEA)	www.p2pays.org/ and www.p2pays.org/iso/
North Carolina Department of Environment and Natural Resources (NC DENR)	www.enr.state.nc.us/
North Carolina State University Industrial Extension Service (NCSU IES)	www.ies.ncsu.edu/
Texas Commission on Environmental Quality (TCEQ)	www.tceq.state.tx.us/ and http://www.tnrcc.state.tx.us/exec/sbea/ems/
Public Agency EMS Group	This is an informal group of public Oregon agencies that have, or are interested in, EMS. The group meets quarterly to share information and discuss EMS practices and procedures.
Registrar Accreditation Board	http://www.rabnet.com/index.shtml

Wastewater's Favorite Sources of EMS Information

- Benchmarking Report: Environmental Management Systems (http://www.cityofseattle.net/environment/Agenda_EMP.htm)
- Best Practices Guide: Application of ISO 14000 EMS for Municipalities (http://www.iie.org/programs/energy/pdfs/Applic%20ISO%2014000%20for%20Municipalities.pdf)
- EMS : An Implementation Guide for Small and Medium-Sozed Organizations (http://www.epa.gov/owmitnet/iso14001/ems2001final.pdf)
- EMS: Do They Improve Performance, University of North Carolina, January 2003. (http://ndems.cas.unc.edu/)
- EMS Troubleshooter's Guide for Local Governments (http://www.peercenter.net/troubleshooters.cfm)
- Ford Motor Company, ISO 14001 EMS Workbook, June 2000 (http://www.p2pays.org/ref/08/07378.htm)
- ISO 14001 Answer Book, Dennis Sasseville, 1997
- ISO 14001 Environmental Management Systems - Guidance Document, Specialty Technical Publishers
- The ISO 14000 Handbook, Edited by Joseph Cascio, ASQ Quality Press
- ISO 14001 Standard and related ISO 14000 series documents
- Management Systems for Public Utilities Integration Project (http://www.cityofseattle.net/environment/documents/AnnualReport2000-1.pdf)
- Moving Toward Comprehensive Utility Management Systems, Report of Environmental ISO 14001 "PIZZA", MGMT Alliance Inc. (http://www.mgmt14k.com/014kpizza.htm)
- NBP EMS Guidance Manual (http://biosolids.policy.net/emsguide/manual/)
- NSF – ISR Policies for Environmental Management Systems Registration. (http://www.nsf-isr.org)
- TCEQ Environnemental Management System, Interim Evaluation Protocols (http://www.tnrcc.state.tx.us/exec/sbea/ems/protocols.html)

Don't forget your current organization's O&M Plans and Environmental Policies and Programs as references and integration opportunities!

Wastewater's Favorite <u>Websites</u> for EMS Information

- NC DEPPA (www.p2pays.org)
- US EPA (www.epa.gov/owm/iso14001/index.htm) & http://www.epa.gov/ems/
- US EPA Region IV (http://www.epa.gov/region04/)
- PEER Center (http://www.peercenter.net/)
- National Biosolids Partnership (http://biosolids.policy.net/)
- Kent County EMS Website (http://www.kentcountydpw.com/)
- National Database on EMS (http://www.eli.org/isopilots.htm)
- Local Government Environmental Assistance Network (LGEAN) Toolbox: (http://www.lgean.org/html/toolbox.cfm)
- Clean Texas (http://www.cleantexas.org)
- TCEQ Environmental Management Systems (http://www.tnrcc.state.tx.us/exec/sbea/ems/index.html)
- Texas Pollution Prevention Resources (http://www.p2plan.org/)
- MGMT Alliances Inc. EMS Homepage (http://www.mgmt14k.com/)
- King County Environmental Links (http://www.metrokc.gov/environ.htm)
- NSF International Strategic Registrations (http://www.nsf-isr.org/)
- PEER Center Local Resource Centers (http://www.peercenter.net/resourcecenters/)

In addition, several other organizations offer valuable EMS guidance and information, including, but in no way limited to, the following:

North Carolina EMS Program (http://www.p2pays.org/iso/)
Multi-State Working Group on EMS (http://www.iwrc.org/mswg/)
National Database on EMS (http://www.eli.org/isopilots.htm)
International Organization for Standardization (ISO) (www.iso.ch)
Registration Accreditation Board (RAB) (www.rabnet.com)

There are also several alternative EMS implementation guidance manuals available:

Continual Improvement in Utility Management: A Framework for Integration
This Guide responds to a defined need within utility management by providing a roadmap showing how a collective group of management initiatives interrelate and how a utility can best approach integrating them in the context of a continual improvement management system framework. This Guide was funded through a cooperative agreement with the U.S. Environmental Protection Agency (EPA), and sponsored by the Association of Metropolitan Sewerage Agencies (AMSA) and the Water Environment Federation (WEF). http://www.peercenter.net/ewebeditpro/items/O73F3799.pdf

An Environmental Management System Troubleshooters' Guide for Local Governments
The Environmental Management System (EMS) Troubleshooters' Guide for Local Governments has been compiled from experiences and lessons learned through various EMS Initiatives for Government Entities. The practical data and case study material has been extracted from over 23 municipal, state, and local organizations which implemented EMSs as participants in these initiatives. The document is structured to systematically lead a facility, by addressing the needs and issues that a facility might encounter, throughout the four phases of EMS implementation. http://www.peercenter.net/troubleshooters.cfm

Environmental Management Systems: An Implementation Guide for Small and Medium Sized Organizations
In December 2000, the U.S. EPA, in cooperation with NSF International, completed this revised version of the original guide intended to offer a plain English, common sense guide to organizations interested in implementing an EMS, using the basic Plan-Do-Check-Act model.
http://www.epa.gov/OW-OWM.html/iso14001/wm046200.htm

Environmental Management Tools for SMEs (Small and Medium Sized Enterprises) - A Handbook
A guidance document produced by the European Environment Agency intended for small- and medium-sized enterprises interested in implementing environmental management practices.
http://reports.eea.eu.int/GH-14-98-065-EN-C/en/enviissu10.pdf

Best Practices Guide: Application of ISO 14001 Environmental Management Systems (EMS) for Municipalities
This guide is for senior and mid-level technical staff (facility managers, directors of engineering or technical services, directors of capital planning) from municipal agencies, utilities and institutions who are interested in implementing an EMS. The guide provides enhanced technical, management and analytical tools for the development of a broader Municipality EMS and a more narrowly structured Municipal Facility EMS.
http://www.iie.org/programs/energy/pdfs/Applic%20ISO%2014000%20for%20Municipalities.pdf

ISO 14001 Guidance Manual
The USA-based National Center for Environmental Decision-making Research has created a document that is specific enough to set up and implement an EMS, but general enough to allow the flexibility for addressing unique characteristics. The various sections of the manual describe each element of the ISO 14001 standard and provide step-by-step procedures and tips for developing and implementing an EMS.
http://www.ncedr.org/guides/iso.htm

Appendix D

EMS Glossary

Glossary

American National Standards Institute Registrar Accreditation Board (ANSI-RAB) – Body that accredits ISO 14001 Environmental Management Systems (EMS) registrars and auditors.

Audit Finding – A discovery of lack of conformance to the requirements of an (ISO 14001-based) 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.

Audit Finding – The discovery of a lack of conformance to the requirements of an EMS (ISO 14001-based) 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.

Auditor – Person with the qualifications to conduct an EMS audit.

Baseline – The starting point from which to track the achievement of an objective. Establish "normalized" baselines to accurately measure how your facility's environmental performance could change over time. Normalized baselines will measure your actual environmental performance changes rather than changes in production, customer demand, or other non-environmental related factors.

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.

Conformance – To verify an organization's EMS to a specified standard (ISO 14001).

Continual improvement – The principle of continual improvement, as fundamental to the ISO 14001 Standard, 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. Continual 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. It is one of the three main commitments of the EMS. After checking their EMS through monitoring and measuring, and find and fix audits, organizations apply the lessons they have learned to improve their environmental management.

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

Corrective Actions – As a result of the audit findings, corrective action reports (CARs) are assigned to all nonconformances to correct EMS deficiencies as they occur. CARs track an audit finding, and assign tasks to be completed, responsibilities, and timeframes.

Corrective Action Request (CAR) – A report form to identify, track and manage corrective actions.

EMS Core Team – A cross-functional team made up of individuals within the organization that helps facilitate EMS implementation across the organization. Team members are the EMS experts and cheerleaders.

Environment – Surroundings in which an organization or facility operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation.

Environmental Aspect – Element of an organization's activities, products or services that can interact with the environment. Aspects = Causes

Environmental Impact – Any change to the environment, whether adverse or beneficial, that results from an organization's activities, products or services. Impacts = Effects

EMS Fenceline – Project scope and/or operational areas in an organization in which the EMS is implemented. For example, for wastewater operations, this could include the pretreatment and the laboratory operations.

External Communication – Providing information and soliciting input, receiving inquiries and complaints, responding, and documenting exchanges with interested parties outside the fenceline of your facility.

EMS Manual – An EMS document that describes your core system elements and how the different elements are interrelated. A "roadmap" for your EMS. Auditors find a manual very useful when verifying your EMS.

EMS Records – Reports, checklists, training, and other data generated that provides verification that your organization is following the EMS as intended.

Work Instruction – Documented work tasks at your facility that provide a detailed understanding of how specific work process(es) are accomplished. For example, an instruction or checklist on the proper disposal of recyclables (batteries, oils and greases, rags, etc.) in your auto maintenance shop.

Emergency Situation – Condition (e.g., 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.

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 your EMS.

EMS Auditor – A qualified and trained individual who conducts EMS audits. Each EMS Auditor should attend documented training that presents the requirements of a standard (e.g., ISO 14001) 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 your organization's EMS internal audits. The EMS Lead Auditor is the leader of your EMS audit team and will report audit findings and observations to management.

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

Environmental Management Representative (EMR) – The clearly-identified EMS team leader who has the responsibility and management authority for implementing the EMS from start to finish.

EMS Core Team – A cross-functional team made up of individuals within the organization that helps facilitate EMS implementation across the organization. They are the EMS experts and cheerleaders.

EMS Audit – A systematic, documented verification process of objectively obtaining and evaluating an organization's EMS to determine whether or not it conforms to the environmental audit criteria pre-defined by the organization and applicable standards (i.e. the ISO 14001 Standard).

EMS Core Team – A cross-functional team made up of individuals within the organization that help to facilitate EMS implementation across the organization. These are the EMS experts and cheerleaders.

EMS Fenceline – Operational area or areas within an organization where the EMS is implemented.

EMS Fenceline – Project scope and/or operational areas within an organization in which the EMS is implemented.

EMS Implementation Team – Individuals within the organization who are closest to the actual workflow and who assist the Core Team and the EMR in better understanding operational activities. Implementation Teams are generally very involved in designing operational controls, testing emergency preparedness and response plans, and identifying the environmental aspects of their daily activities.

Environmental Target – Detailed performance requirement, quantified where practicable, based on an organization's defined environmental objectives and that must be met in order to achieve those objectives.

Environmental Aspect – Element of an organization's activities, products or services that can interact with the environment. Aspects = Causes

Environmental Impact – Any change to the environment, whether adverse or beneficial, that results from an organization's activities, products or services. Impacts = Effects

Environmental Objective – An overall environmental goal based on an established environmental policy, that an organization sets itself to achieve. Wherever possible, environmental objectives should be quantified, in order to facilitate the evaluation of environmental performance and the measurement of progress towards specific environmental targets.

Environmental Target – A detailed performance requirement, quantified where practicable, that arises from the environmental objectives and that needs to be set and met in order for the objective to be achieved.

EMS Awareness Training – Training involving an overview of the basics of your EMS, including your environmental policy, significant aspects, objectives and targets, and the importance of operating under specific procedures and work instructions (operational controls) required under the EMS.

Environmental Management Program (EMP) – A structured program with a set of specific identifiable actions (an "action plan") providing the direction for EMS objectives and targets to be obtained and tracked. Your EMP should assign tasks, resources, responsibilities, and timeframes for achieving your objectives and targets.

Environmental Management Representative (EMR) – The clearly-identified EMS team leader who has the responsibility and management authority for implementing the EMS from start to finish.

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

Environmental Performance – Measurable results of the EMS related to an organization's control of its environmental aspects, based on its environmental policy, objectives and targets.

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 and targets.

Environmental Objective – An overall environmental goal based on an established environmental policy, that an organization sets itself to achieve. Wherever possible, environmental objectives should be quantified, in order to facilitate the evaluation of environmental performance and the measurement of progress towards specific environmental targets.

Environmental Target – A detailed performance requirement, quantified where practicable, that arises from the environmental objectives and that needs to be set and met in order for the objective to be achieved.

"Footprint" – The environmental impact of your facility - how your operations and services interact with the air, water, land, resources, local and regional community, etc.

Gap Analysis – Preliminary assessment of an organization's environmental programs and management practices to see where they match up with EMS requirements.

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 your fenceline – to be interested parties.

Internal Communication – Flow of information top-down, bottom-up, and across your entire EMS fenceline.

ISO 14001 – One of the Environmental Management Standards developed by the International Organization for Standardization in Geneva, Switzerland. It is the requirements document that specifies the seventeen (17) elements of an EMS. It is the standard protocol (requirements document) in the ISO 14000 series that specifies the necessary elements of an EMS.

Key Characteristic – An element of an operation or activity that can be measured or evaluated for environmental performance of objectives and targets.

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.

Major Nonconformance – A deficiency in meeting the requirements of an EMS. One or more of the 17 elements of the EMS are not addressed (e.g., no system procedure) or implemented (e.g., not following a system procedure as written).

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 your system. For example, a number of employees were overdue on their EMS refresher training.

Observation – A recognition of something done incorrectly or an area of concern. While not a major or minor nonconformance with an EMS requirement, if done correctly it could strengthen the EMS or if done incorrectly, could potentially cause a system failure.

Other requirements – The rules and guidelines that an organization follows that are not legally binding under existing environmental laws, but to which an organization is committed (e.g., industry standards or voluntary guidelines). Under an EMS, these requirements require the same commitment as legally binding requirements.

Operational Controls – Documents 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, programs, etc. Examples include maintenance work, pretreatment operations, chemical ordering, etc.

Performance Indicators – Measurement tools, selected by management that can be used to support the evaluation of environmental performance in relation to a specific target. Performance indicators may be adjusted to meet specific management needs or as necessary to ensure progress towards specific environmental 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.

Preventive Actions – A proactive approach to managing actions that are assigned to any EMS nonconformance made that will prevent potential environmental issues before they occur.

Registrar – A third-party organization that awards the EMS certification.

Registration – A recognized validation that an EMS has passed an accredited independent, third-party audit.

Root Cause – Underlying reason that led to or may lead to an EMS nonconformance. For example, if a group of employees were not following a procedure, the underlying cause could be that they were not properly trained on the procedure or that an updated procedure was not communicated to them.

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 ISO 14001 Standard.

Stakeholders – Groups and organizations having an interest or stake in an organization's EMS (e.g., regulators, shareholders, customers, suppliers, special interest groups, residents, etc.).

Surveillance – A scheduled sampling of EMS elements to maintain a third-party registration.

System Procedure – An EMS (ISO 14001) required document that establishes purpose, scope, roles & responsibilities, the tasks to be completed, and where and how the associated records and documents are maintained.

Third-Party – An independent EMS auditor that is qualified to conduct EMS audits.

Top Management – Person or group with executive responsibility for the organization and the EMS.

Work Instruction – A series of steps and activities directed to a very specific area or process. Examples include cleaning the rake at wastewater pretreatment operations and calibrating a pH meter.
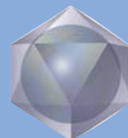
Environmental Management System (EMS)

Handbook for Wastewater Utilities

Achieving Environmental Excellence:
An Environmental Management Systems (EMS)
Handbook for Wastewater Utilities

ACT   PLAN
CHECK   DO

August 2004
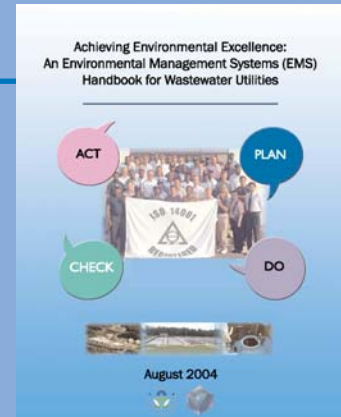
EMS Aspects Identification and Prioritization Workbook

May 2006

EMS Wastewater Environmental Aspects Steering Committee

Bob Bois
Environmental Compliance Officer
Springvale Water Treatment Plant
Natick, Massachusetts

Sherri Gee
ISO Coordinator
Oakland County Drain Commissioner
Waterford, Michigan

Tom Pedersen
Vice President
Camp Dresser & McKee
Cambridge, Massachusetts

Jim Newton
Environmental Program Manager
Kent County Public Works Department
Dover, Delaware

Foreward

Water and wastewater utility managers are facing a number of challenges today as they address a wide array of issues ranging from increased public expectations for service levels, improved environmental performance and compliance, sustainable infrastructure expectations/needs, changing work force demographics, and more stringent regulatory standards. To help address these challenges on an ongoing basis, a number of utilities are developing and successfully implementing an environmental management system (EMS) for their operations. Based on this success, a step-by-step EMS Handbook for Wastewater Utilities (http://www.peercenter.net/sector/wastewater/) was developed in August 2004 and was written in conjunction with knowledgeable wastewater EMS practitioners. The Handbook includes EMS sample documents and practical ideas and lessons learned from wastewater treatment facilities that have developed an EMS.

The identification and prioritization of significant environmental aspects and impacts is one of the most important and challenging parts of implementing an EMS. Conducting a sound aspect/impact analysis is critical to implementing a viable EMS, as significant environmental aspects become the primary focal points for the EMS, and all subsequent EMS tasks are designed to control, reduce or eliminate your wastewater utility's environmental impact.

This *EMS Aspects Identification and Prioritization Workbook* was produced to compliment the Handbook described above and guide users through this difficult step in the EMS process. The Workbook was funded through a cooperative agreement between the Office of Wastewater Management (OWM) at the U. S. Environmental Protection Agency (EPA) and the Global Environment and Technology Foundation (GETF). In order to reflect the real life EMS experiences of wastewater organizations, EPA and GETF again asked a small group of utilities and other professionals to serve on a Steering Committee for this project. Their advice and insights were critical to making this project a success.

Throughout this Workbook, you will see step-by-step lessons and exercises, along with the experiences from several wastewater organizations, to make it easier for you to successfully complete your EMS aspects/impacts review.

In conclusion, we appreciate the opportunity to help produce this Workbook and further share our experiences with colleagues. It fills an important need for our industry and will hopefully encourage an increasing number of utilities to develop their own EMS and realize the benefits we have witnessed. Remember, this Workbook relies on much of the material included in the Handbook and you should use both as tools to help implement an EMS at your wastewater utility.

Table of Contents

You'll find the following icon symbols in each section:

Keys to Success indicates key takeaways to successful EMS implementation, as identified by EMS wastewater practitioners.
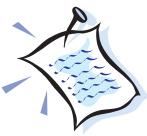
Notes highlight a point or concept important to EMS implementation.

**Reminders** are key points to keep in mind as you implement your EMS.

Stop Signs/Review identify key concepts to review in the Handbook before completing each of the steps and lessons in the Workbook.

To the User

This *EMS Aspects Workbook* was created to accompany *An Environmental Management System (EMS) Handbook for Wastewater Utilities* (*Handbook*), August 2004 (http://www.peercenter.net/sector/wastewater). Similar to a chemistry lab workbook that accompanies and builds on the chemistry text, the EMS *Workbook* lessons and activities are designed specifically to help wastewater and other public and private organizations conduct an environmental aspect and impact analysis at their facilities.
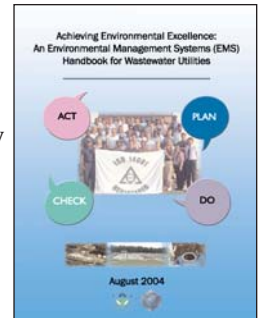
Each lesson in the *Workbook* corresponds to the steps presented in Section 3: Environmental Aspects and Impacts (pages 61-74) of the *Handbook*. Each lesson will define the Objective of the lesson, provide a brief Background of the concept, have the user complete Lesson Exercises where applicable, and finally review the Key Takeaways specific to each lesson.

Note that after each of the lessons, the *Workbook* directs the user to additional applicable blank EMS aspect/impact forms and templates (found in Appendix B) for your EMS Wastewater Teams to practice with and/or to use as tools as you conduct your aspects/impacts review and develop and implement your wastewater EMS.

The *Workbook* utilizes proven techniques collected from training and working with numerous public organizations that have successfully implemented EMSs at their organizations. However, there are alternative methods to conducting aspects/impacts analysis and implementing an EMS than those highlighted in this *Workbook* and readers should review those methods to see which ones fit best for their organizations. For more information, review Appendix C: Additional Sources of Information in the *Handbook*.

> **STOP**
>
> **Review**
> Review Section 3: Environmental Aspects and Impacts in the *Handbook* (pages 61-74) as you complete this *Workbook*. Specific steps and page numbers in the *Handbook* will be highlighted for review in each lesson.

Note

Clarifying EMS jargon is important for consistency if your facility is following the ISO 14001 Standard or National Biosolids Partnership (NBP) guide.

Lesson 1) Clarify EMS Jargon with Your Team

Objective: To obtain a working knowledge of environmental management system (EMS) terms and their meanings, particularly as related to defining your wastewater organization's environmental aspects and impacts.

Background: It's important that you have a clear understanding of EMS terms and their meanings, from defining the wastewater operations where you will implement your EMS (your fenceline), to who should be involved (employees and stakeholders), to the impact of your products, services (e.g., treated wastewater) and activities (e.g., primary treatment operations)—your environmental "footprint." This lesson and its exercises will particularly focus on helping you and your team understand differences between activities, aspects, and impacts.

First let's review the definitions:

Operation/Activity: Something that an organization does, usually intentionally.

Aspect: An element of an organization's activities, products or services that can interact with the environment.

Impact: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

Lesson 1 Exercises:

Now try these quizzes with your EMS Team.

A. Indicate which of the following terms is an operation/activity, aspect, or impact.

1. Air pollution   1.
2. Burning diesel fuel   2.
3. Digester Operations   3.
4. Operating/Maintaining Backup Generators   4.
5. (Electrical) energy consumption   5.
6. Water consumption   6.
7. Herbicide Application   7.
8. Burning bio-diesel fuel   8.
9. Spilled Solvent   9.
10. Recycling Program   10.
11. Cleaning Spills   11.
12. Degradation of water quality   12.
13. Generation of solid waste   13.
14. Designing construction specifications   14.
15. Restoring natural resources   15.
16. Air emissions   16.
17. Steam cleaning   17.
18. Depletion of landfill space   18.
19. Purchasing supplies   19.
20. Contamination of ground water   20.

Remember

Environmental Aspects are elements of your utility's activities or products or services that can interact with the environment. For example, the air emissions are the aspects of the burning of fuels (the activity). Environmental impacts are the changes to the environment, positive or negative, resulting from your organization's operations and activities. For example, the degradation of air quality is the impact from the burning of fuels.

Put another way:

Aspects = Causes
Impacts = Effects

B. Indicate which of the following wastewater terms is an operation/activity, aspect, or impact.

1. Odors	1.
2. Receiving and Transporting Chemicals	2.
3. Biodiesel Fuel Use	3.
4. Reduction in Landfill Space	4.
5. Maintaining Operations Buildings	5.
6. Solid Waste Generation	6.
7. Biosolids (Beneficial Product +)	7.
8. Reduction in Natural Resources	8.
9. Biodegradable Chemical Use (+)	9.
10. Chlorine Disinfection	10.

C. Indicate which of the terms below are operations/activities and then designate their corresponding aspects and impacts.

In the example, the corresponding terms used in the table are crossed-out for you to follow as an example.

Now it's your turn! Complete the rest of the table (remaining 3 rows) using the terms that are not crossed-out.

Note: Biosolids Application as an Operation/Activity will be used more than once.

~~Biosolids Land Application~~   Reduction in Landfill Space   Odors

~~Receiving and Transporting Chemicals~~   ~~Degradation of Air, Land or Water~~

Nuisance   ~~Spills and Leaks~~   Sludge Reuse   Beneficial Product +

~~Air, Soil and Groundwater Contamination~~   Solid Waste Generation (e.g., Rags, Supplies)

Aerobic Digestion   ~~Odor, Dust, Runoff~~   Maintaining Operations Buildings

Operation/Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)
Biosolids Land Application	Odor, Dust, Runoff	Degradation of Air, Land or Water and Public Complaints
Receiving and Transporting Chemicals	Spills and Leaks	Air, Soil and Groundwater Contamination

Remember

As you can see, some aspects may actually have a positive impact. Other examples include using a (biodegradable) chemical in place of a hazardous chemical in a preventative maintenance activity and using low flow toilets and motion lighting in your facility operations and administrative buildings to conserve water and energy.

Key Takeaways

While a majority of employees at a wastewater treatment facility have an understanding of how they could potentially impact their own health and safety, how their work could impact their natural surroundings (i.e., the environment) introduces new terms/meanings that need to be understood in order to implement and maintain an EMS . If your employees are still having trouble with these terms, practice with some examples from your own environmental "footprint" at home. For example, consider the *operation/activity* of *running your air conditioner* in the summer. The *aspect* would be *energy use* and the *impact* would be the *depletion of natural resources*—not to mention the impact on your utility bill!

Lesson 2) Confirm Your EMS "Fenceline"

Objective: To review which operations and supporting activities that will be the focus of your EMS (i.e., your "fenceline"), and to confirm management understanding of the human and financial resources involved.

Background: An EMS can be applied to any operation or organization within your wastewater facility (e.g., a department, division, operation or your entire facility). Before you begin your aspect and impact review consider these questions:

- Have you identified the specific organizational and environmental objectives that you want the EMS to deliver?

- Do you have clear management approval for EMS development?

- Have you estimated the level of resource commitment you need from staff and who will be involved in EMS implementation? (Remember, EMS implementation is going to compete for employee time and with other responsibilities, and this may need to be managed. This is especially true at the beginning in scheduling EMS Core Team responsibilities.)

- Which managers in the fenceline need to approve EMS development to ensure that appropriate human and financial resources are allocated?

- Have you met with these key staff managers throughout the organization to discuss the proposed EMS implementation schedule?

Review

STOP

Refer to Section 3, Step 2 (page 63) of the *Handbook* for more information about choosing your EMS wastewater fenceline and for further review.

It may be tempting at first to include all of your operations and facilities within your EMS scope. However, it is usually unrealistic for most organizations to manage such a scope initially considering the human and financial resources involved. Consider starting with a smaller section of your organization and adding more departments and facilities as your EMS experience and expertise grows. This will help you develop a solid understanding of the EMS process and a group of internal experts that can act as mentors as your EMS grows.

Practical Experience

Often a memorandum or letter from senior management is useful to confirm understanding of management's commitment to proceed with EMS development and to state the specific business rationale, drivers, and expected benefits for development of the EMS.

See Appendix D for an example from a wastewater treatment facility.

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Figure 1 below presents a simple, typical wastewater facility-level diagram as an example of wastewater treatment as the operational fenceline.
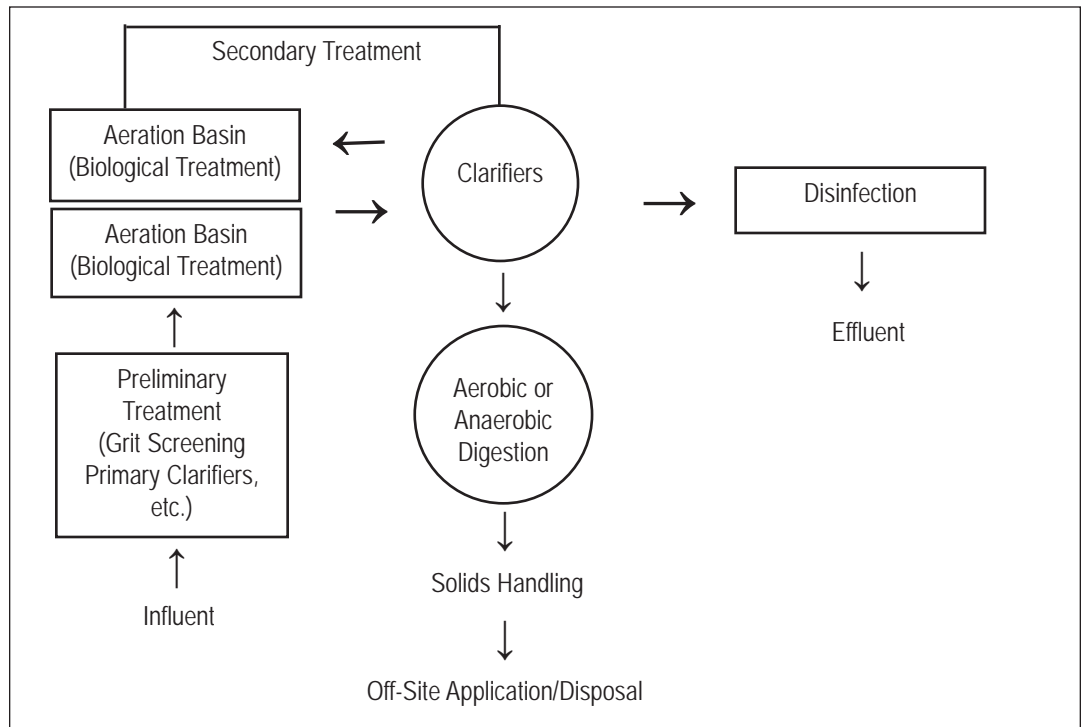

Figure 1: Wastewater Treatment Plant #1

Now let's say that your organization selected secondary treatment (biological treatment/aeration basins and clarification) as its EMS fenceline.
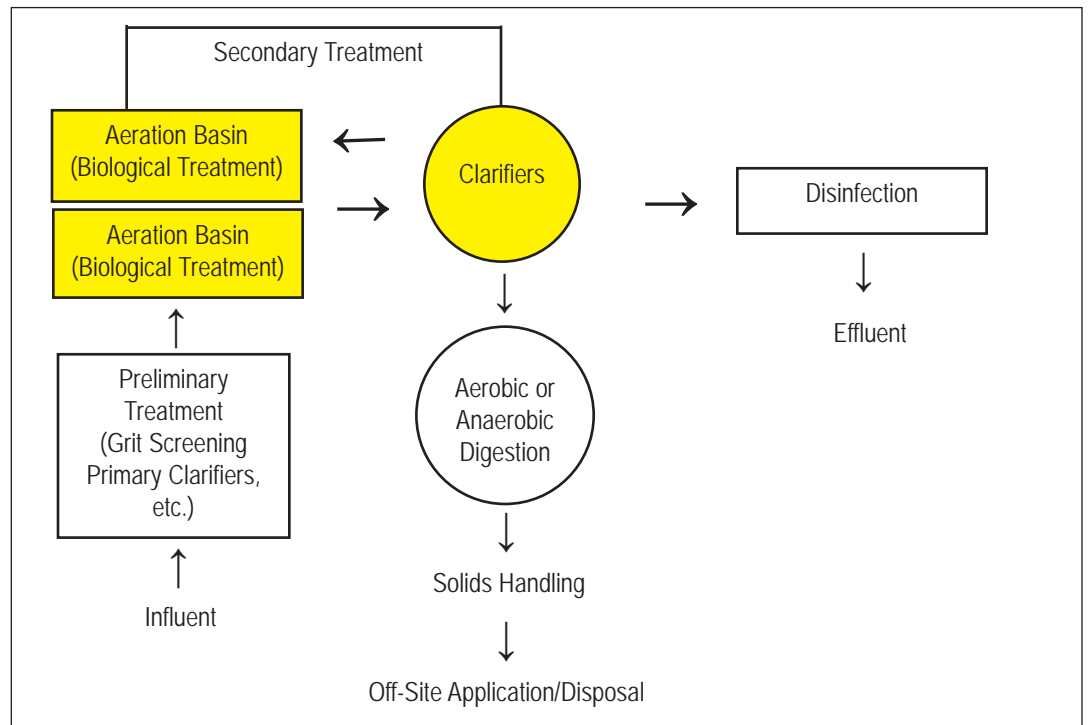

Figure 2: Wastewater Treatment Plant #2

Note that Aeration Basin and Clarifiers have been highlighted or selected.

The diagram in Figure 2 is an example of the EMS Fenceline (i.e., Aeration Basins and Clarifiers) that we will be using throughout this *Workbook*.

Now that you've mastered the exercises on EMS jargon and documented your EMS scope, it's time to determine how your fenceline will impact the environment (your environmental "footprint").

To accomplish this, sticking with a systematic process, organizations commonly utilize input/process/output diagrams to help them understand and visualize the processes as well as how materials are used, re-used and disposed of within each operation or activity.

Key Takeaways

The advice of other wastewater facilities that have implemented an EMS is: "Think big, but start small!" In addition, build internal EMS expertise and understanding, then expand the fenceline based on resources and receptiveness.

Lesson 3) Identifying Operations in Your EMS Fenceline: Constructing Input/Process/Output Diagrams

Objective: To identify the operations within your EMS fenceline (operations include activities, products, and services) and how they impact the environment.

Background: To understand your environmental aspects and impacts, it helps to understand the inputs/processes/outputs-starting with the resources, wastes and products-that are a part of the operations and activities associated with your wastewater EMS Fenceline.

STOP Review

Refer to Section 3, Step 3 (pages 64-65) of the *Handbook* for more information about constructing input/process/output diagrams and for further review.

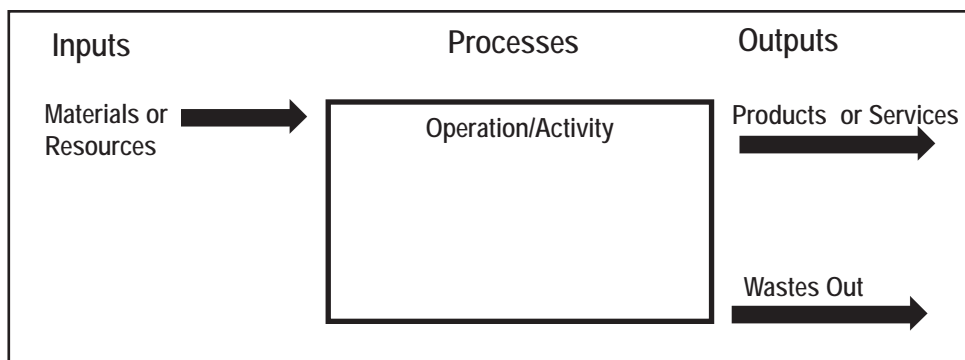A sample format for an input/process/output diagram is presented below.

Figure 3: Basic Input/Process/Output Diagram

Remember

One way to visualize the environmental "footprint" of your operations and activities is to construct input/process/output diagrams. These diagrams will help you identify what materials and resources you use (inputs), where they are used (the process or operation/activity), and how they are turned into a product or service or become wastes (output).

See Figure 3 at the bottom of this page.

Note

Some organizations also capture by-products (e.g., recyclables) as part of their outputs when completing their input/process/output diagrams. See page 65 of the *Handbook* for more information.

Before you complete your input/process/output diagrams, let's first review the following terms:

Materials or Resources - Inputs into a facilities' operations/activities that are used or expended and that can be drawn on when needed (e.g., energy, equipment, chemicals, water, employee labor).

Processes - Operations/activities that bring about a result in the making or treatment of a product (i.e., treated wastewater) through specific steps. Examples for a wastewater facility would include preliminary treatment, clarifier operations or disinfection.

Waste - Outputs of operations/activities that are used, consumed, spent, or expended (e.g., waste oils/lubricants, trash, air emissions).

Products or Services - A direct result (output) produced by operations/activities (e.g., treated wastewater, in manufacturing—a widget).

At this point you are probably thinking, "okay we can do this, let's sit down and drum up a list, we pretty much know how aeration basins and clarifiers can impact on the environment." Although your team could probably brainstorm a pretty good list, the process of first developing visual input/process/output diagrams focuses your efforts to ensure that you cover all the bases and that nothing slips through the cracks. It's a systematic and replicable process that will provide consistency to your aspect/impact review.

In addition, by developing input/process/output diagrams, your team will be able to focus not only on impacts, but also the activities and the operations that create them. This is the key to effective management and operational control of an activity.

A great way to determine the inputs and outputs (i.e., resources, wastes and products) of a particular operation/activity (i.e., process) is to brainstorm with your wastewater staff that work in the area you are reviewing. For example, take a look back at the Wastewater Treatment Plant Diagram #2 (Figure #2). Let's focus on the aeration basin as the main operation/activity and generate a list of operations/activities.

Some of the operations/activities (i.e., processes) you identified may include the following:

● Air Diffusion

● Inspecting/Controlling Bio-Organisms

● Preventative Maintenance

● Monitoring (Oxygen, Odor, Diffusers, Flow)

● Skimming Floatables

For the purposes of Lesson 3, we'll focus on the air diffusion operation/activity and carry that example forward through the *Workbook*. Then your Team will practice this method for clarifier operations.

Using a blank input/process/output diagram that you'll find in Appendix B, work through the following questions regarding the air diffusion operation/activity with your team to

determine the resources, wastes and products for the aeration basin operations/activities listed above.

What are the materials and resources (inputs) that are important to the air diffusion process?

- George calls out, "Air from the blowers is an input."

- Amy remarks, "Energy is required to run the air diffusion operations."

- Steve notes "Sometimes back-up power is required," and he mentions that emergency generators should be on the diagram.

- Joe then thinks about what's needed for the emergency generators to operate and suggests that we include fuel as well.

Reviewing the diagram below, your team has filled in the inputs—resources—for air diffusion (highlighted).
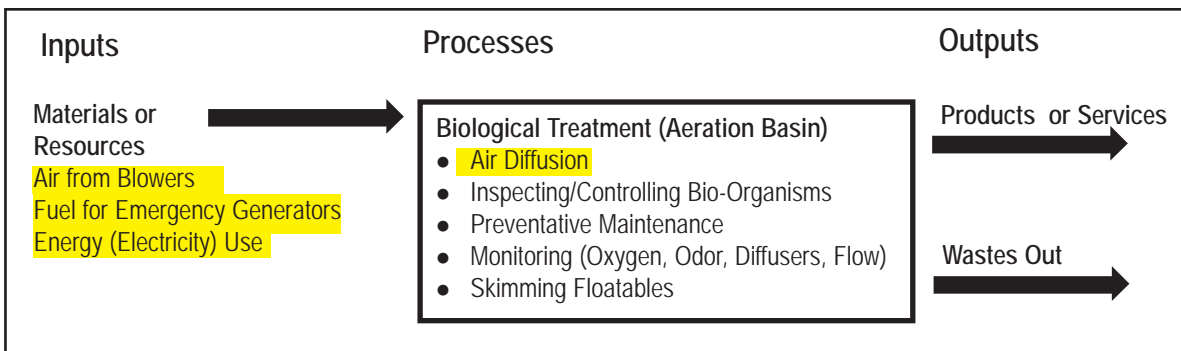
Inputs	Processes	Outputs
Materials or Resources	**Biological Treatment (Aeration Basin)**	**Products or Services**
Air from Blowers	• Air Diffusion	
Fuel for Emergency Generators	• Inspecting/Controlling Bio-Organisms	
Energy (Electricity) Use	• Preventative Maintenance	
	• Monitoring (Oxygen, Odor, Diffusers, Flow)	**Wastes Out**
	• Skimming Floatables	

Figure 4: Wastewater Aeration Basins Input/Process/Output Diagram

Next, it's time to determine the **outputs,** or the wastes and products**,** of the air diffusion process. Brainstorm with your team…

What are the *outputs* that come from the air diffusion *process*?

- Amy notes that odors are usually produced from the air diffusion process.

- Steve chimes in "VOCs are also produced while the diffusers are operating."

- Joe thinks about the emergency generators and mentions that VOCs can also be produced while the generators are operating. He adds that he is required to wear hearing protection when he tests or operates the back-up generators, and that noise should be added as well.

- One of the clarifier operator staff, sitting in on the discussion mentions that she gets the treated wastewater from the aeration basins and she wonders if this should be part of the diagram even though it is an environmental improvement.

Reviewing the diagram below, your team now has filled in the outputs for air diffusion (highlighted), including a positive environmental output-treated wastewater.

Inputs	Processes	Outputs
Materials or Resources Air from Blowers Fuel for Emergency Generators Energy (Electricity) Use	**Biological Treatment (Aeration Basin)** • Air Diffusion • Inspecting/Controlling Bio-Organisms • Preventative Maintenance • Monitoring (Oxygen, Odor, Diffusers, Flow) • Skimming Floatables	**Products or Services** Treated Wastewater+ to Clarifiers

Wastes Out
Air Emissions (Odor)
Air Emissions (VOCs)
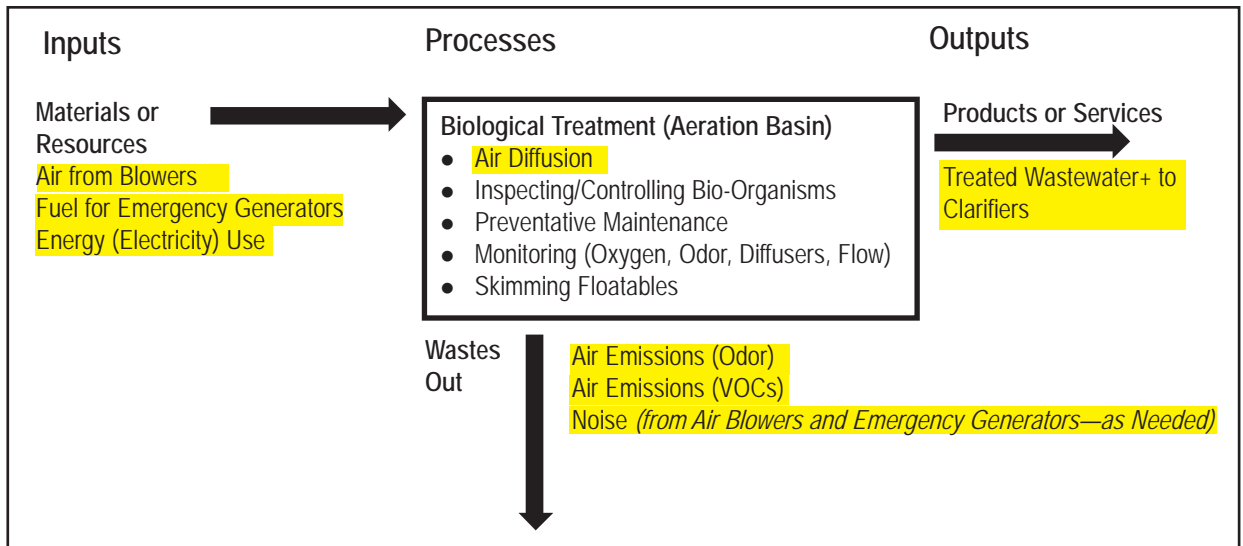Noise *(from Air Blowers and Emergency Generators—as Needed)*

Figure 5: Wastewater Aeration Basins Input/Process/Output Diagram

Now it's your turn! Complete the rest of the aeration basin input/process/output diagram using the blank diagram located in Appendix B.

How did you do? Check out a complete example aeration basin input/process/output in the Lesson 3 Answer Key in Appendix A.

Lesson 3 Exercises:

Reviewing the completed aeration basin input/process/output diagram in Lesson 3 of Appendix A, complete a list of the typical input/process/output diagram for a wastewater **clarification** operation.

How did you do? Check out a completed input/process/output diagram for a typical wastewater clarifier in the Lesson 3 Answer Key in Appendix A. Keep in mind, all facilities are different, so your wastewater input/process/output diagram may not match ours.

Appendix B contains a blank input/process/output diagram that you can copy and use for the additional operations/activities at your wastewater facility as you complete the aspects/impacts analysis.

Now that your team has determined the inputs and outputs of the air diffusion process and has identified your core operational fenceline activities and created diagrams to "visualize" your processes, it's time to create your list of environmental aspects and impacts.

Remember
Aspects are causes of changes to the environment, and impacts are the effects they produce.

Remember
Complete an input/process/output diagram review for all your air diffusion operations/activities (e.g., inspecting and Controlling Bio-Organisms, Preventative Maintenance) and subsequent fenceline processes (e.g., Primary Treatment, Disinfection).

Key Takeaways
Creating input/process/output diagrams is a good, systematic and replicable way to identify and visualize the products, activities, and services in each operation/activity, as well as how materials are used, disposed of and turned into products within your wastewater EMS fenceline.

Lesson 4) Develop a List of Your Environmental Aspects and Impacts

Objective: To use input/process/output diagrams of wastewater operations and activities to create manageable lists of environmental aspects and impacts.

Background: The most common approach to developing a list of your wastewater environmental aspects and impacts is to develop a matrix from each of the input/process/output diagrams and to input and collect the relevant information about environmental aspects and impacts in a manageable and organized manner.

> **STOP**
> ### Review
> Refer to Section 3, Step 4 (pages 66-67) of the *Handbook* for more information about developing lists or matrices of environmental aspects and impacts and for further review.

Now that we have input/process/output diagrams to help us visualize and account for all the activities in our wastewater fenceline, we can begin to:

1. Analyze how aspects of these activities interact with or cause a change to the environment, and

2. Evaluate what positive or negative environmental effects or impacts will result.

Get back together with your wastewater team with your air diffusion input/process/output diagram in hand. It's time to develop a list or matrix of your wastewater environmental aspects and impacts. You may start with a matrix that looks like this:

Aeration Basin Operation/Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)
Air Diffusion		

Now, work with your team to input the various aspects associated with the air diffusion operation/activity. In defining aspects remember to focus on the environmental interactions that create releases into the environment: air emissions, releases to water, solid waste management, contamination of land, use of raw materials and use of natural resources.

Remember, aspects are how these processes interact with the environment and are the causes of potential environmental impacts.

Don't forget to include your positive aspects and impacts! Take a look at your pollution prevention plans, reuse and recycling initiatives, etc. already in place at your wastewater facility. Build momentum from how you are currently minimizing and preventing pollution.

Remember
You could develop a list of aspects and impacts without the input/process/output diagrams. However, it is recommend by public utilities who have implemented EMSs that you first visualize (through input/process/output diagrams) and then brainstorm aspect/impact lists with your cross-functional teams to obtain a complete understanding of the environmental impacts of your operations.

Note
When you identify your wastewater aspects and their impacts, consider:

1) Regulated Aspects (e.g., Air Emissions, Water Discharges);

2) Non-Regulated Aspects (e.g., Electrical/Energy Use, Land Use);

3) Emergency Situations/Conditions (e.g., Spills, Leaks); and,

4) Positive Impacts on the Environment (e.g., Recycling Paper, Re-Use of Water, Using Biogas as an Energy Source).

Entering the aspects from the air diffusion example in Lesson 3, our example matrix would look like this:

Aeration Basin Operation/Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)
Air Diffusion	Air Emissions (VOCs) Air Emissions (Odor) Noise Energy Use Fuel Use	

Next, let's add the potential environmental impacts of each aspect to our matrix.

For each aspect identified in your matrix above ask your EMS team:

- Does this Aspect **cause** any positive or negative changes to air quality, water quality, or soil quality?

- Does this Aspect **cause** any positive or adverse changes to the consumption or depletion of natural resources?

- Does this Aspect **cause** any Nuisance issues?

- Does this Aspect **cause** any Stakeholder issues?

- Does this Aspect **cause** Human Health concerns?

If the answer to any of these questions is "yes", you have a good start at identifying the environmental impacts associated with your aspects.

Keep in mind that you can have several impacts per aspect. However, for simplicity, we've identified only one impact per aspect in our example below.

Entering the impacts for each aspect for air diffusion, our example matrix for would look like this:

Aeration Basin Operation/Activity	Aspects (Cause of Impact)	Effects (Potential Impacts)
Air Diffusion	Air Emissions (VOCs)	Degradation of Air
	Air Emissions (Odor)	Nuisance
	Noise	Nuisance
	Energy Use	Depletion of Natural Resources
	Fuel Use	Depletion of a Natural Resource
		Treated Wastewater +

Note potential health & safety impact (Noise and Air Emissions) for the emergency generator activity in the Aeration Basin Table above. Although the *Handbook* and this *Workbook* focus on the implementation of an environmental management system, analyzing employee health and safety impacts during the environmental review is a good way to get buy-in from staff. Keep in mind that anything that affects employees or their families will be of interest and more easily understood.

Now it's your turn! Complete an aspect/impact aeration basin matrix using the aeration basin input/process/diagram you completed in Exercise 3, the list of aeration basin operations/activities and the blank matrix located in Appendix B.

How did you do? Check out a complete aeration basin aspect/impact matrix in the Lesson 4 Answer Key in Appendix A.

Lesson 4 Exercises:

Now it's your turn! Referring back to the wastewater plant diagram #2 (Figure #2), take the clarifier operation/activity and complete the following 5 activities per the example your team completed for the aeration basin. You'll find the blank forms you need in Appendix B.

1. Develop a list of clarifier operations/activities.

2. Brainstorm and identify the resources, equipment and materials (inputs) and wastes and products (outputs).

3. Create a clarifier input/process/output diagram.

4. Brainstorm and identify clarifier aspects and their associated impacts.

5. Create an aspect/impact list or matrix of your wastewater facilities clarifier operation/activity.

Remember you will complete these same steps for all operations within your fenceline at your wastewater treatment facility.

How did you do? Check out a complete clarifier aspect/impact analysis in the Lesson 4 Answer Key in Appendix A.

Key Takeaways

"Don't get too far down in the weeds"
Wastewater facilities and other public organizations have reported getting caught up in too much detail and generating very large lists of environmental aspects and impacts. For example, you do not need to list and capture the use and generation of rags and other general trash (solid waste) from every area that uses and generates solid waste. Remember, this is an iterative process—a process that stresses the importance of continuous improvement. Make your lists manageable and if you do not catch every aspect/impact at the first go around, it's okay. You will most likely catch it during the next cycle as your EMS is refined and matures.

In addition to staying out of the weeds, keep in mind that there are daily (continuous) activities that generate aspects and impacts that may need to be "rolled-up" from multiple operations/activities so that their impacts are captured. For example, while energy use may not be an issue from activity to activity, if you examine the overall use of energy, you may decide that it requires further focus as a high priority issue under your EMS.

Now that you've developed your lists of activities and their environmental aspects and impacts, it's time to prioritize or rank the activities that could have the greatest impact to the environment.

Lesson 5) Prioritize Your Environmental Aspects and Impacts

Objective: To rank (prioritize) your wastewater environmental aspects and impacts.

Background: At this point you have a good list of operations/activities and their associated environmental aspects and impacts. An EMS is structured so that you can narrow the list down, through a ranking technique, to a group of the most "significant" to your wastewater facility. These significant aspects and impacts will be the focus of your EMS from here on.

To determine your most significant aspects, first determine what criteria are most important to your wastewater facility to evaluate the significance of your impacts. Is it Regulation? Energy use? Public Image? Worker Heath and Safety? Water Pollution?

Here are a number of criteria that have been used by wastewater facilities and other public organizations in the ranking process:

- Changes to Air, Water and Land

- Impact to Natural Resources

- Regulated

- Cost

- Nuisance

- Stakeholder Impact

- Human Health Impacts

For the purposes of an example in this lesson, we will follow the Keep It Simple and Smart (KISS) rule and select just a few criteria that you can use to practice ranking your wastewater aspects to determine which are the most significant. Let's select changes to air, water and land; impact to natural resources; stakeholder impact and cost.

Most organizations choose about 5 to 7 significance criteria when they conduct their aspects/impacts analysis. Remember to keep it simple and smart, the KISS rule. There is no need to develop complex formulas or scientific analyses in this process. Choose criteria that are most important to your strategic goals and to the issues that are of most concern to your wastewater organization.

Referring back to the aeration basin example and adding in columns for our criteria, our table would look like this:

Aeration Basin Operation/Activity	Aspects (Causes of Impacts)	Effects (Potential Impacts)	Changes to Air, Water, Land	Impact to Natural Resource	Stakeholder Impact	Cost
Air Diffusion	Air Emissions (Odor, VOCs), VOCs Noise, Energy and Fuel Use	Degradation of Air, Nuisance, Depletion of a Natural Resource Treated Wastewater +				
Inspecting/Controlling Bio-Organisms	Energy (Electricity) Use	Depletion of a Natural Resource and Degradation of Air				
Preventative Maintenance	Solid Waste Generation	Use of Landfill Space				
Monitoring (Oxygen, Odor, Diffusers, Flow)	Energy Use & Supply/Paper Use	Depletion of Natural Resources				
Skimming Floatables	Solid Waste Generation	Use of Landfill Space				
Emergency Generator Operations	Noise, Air Emissions and Fuel Use	Nuisance, Health & Safety, Degradation of Air and Air Emissions and Depletion of a Natural Resource				

Now, it's time to develop a scoring system to go with our criteria. Once again, the KISS rule applies. Make sure that the scoring system you use is understood by all that will participate on your cross-functional evaluation teams.

Note "Stakeholder Impact" and "Cost" in our criteria.

Many public organizations consider their stakeholders (e.g., regulators, the local community, elected local officials) important in determining what is environmentally significant at their facilities.

Since we choose cost as one of our criteria, we need to come up with a means to evaluate the significance for cost. For the purposes of this Lesson, we will evaluate the significance criteria of **cost** as follows:

1 = a one time, relatively low cost, 3 = an occasional outlay of dollars and/or medium cost, 5 = ongoing outlay of dollars or high cost.

Remember to clearly define the significance criteria for your team.

Examples of significant aspect/impact scoring systems used by wastewater treatment facilities and other public organizations include the following with low, medium, high, etc. designating the level of (potential) environmental impact.

- 1 = Low, 3 = Medium, 5 = High

- 1 = Low, 3 = Medium, 5 = High, and multiplying each aspect/impact by a weighted frequency or likelihood factor (e.g., multiply by 1 if the impact almost never happens such as a leak or spill … to multiplying by 5 if the impact is a daily occurrence such as the generation of trash/solid waste)

Again, for the purposes of this lesson, we are going to follow the KISS rule and chose our scoring system as:

☑ 1 = Low, 3 = Medium, 5 = High, with no weighting factors.

OK—let's go! Get with your team and let's apply the 4 criteria and scoring system to each of the listed activities and environmental aspects and impacts to achieve a total numerical prioritization (or rank) for each. Keep in mind that this analysis is usually completed as a team with the team reaching a consensus on score.

Let's complete the aeration basin example by adding another column to find a total significance score. For example, for inspecting and controlling organisms, we ranked our significance as 1, 5, 5, 5 to get a total score of 16 because:

- Inspecting and controlling organisms is a controlled process with little or low change to air, water or land (i.e., surrounding environment)

- Inspecting and controlling organisms is an energy (electricity) intensive process and therefore we gave it a 5 for impact to natural resources

- And so on for each of the criteria as provided on the next page

Then, it's simply a matter of sorting each of the aeration basin activities from highest to lowest score.

Remember

This is a subjective analysis! Just make sure that when you finish your scoring, you do a reality check ("gut check") with staff that work in clarifier operations to verify that your operations and activities rank out in a manner that makes sense for their level of environmental impact.

Aeration Basin Operation/Activity	Aspects (Causes of Impacts)	Effects (Potential Impacts)	Changes to Air, Water, Land	Impact to Natural Resource	Stakeholder Impact	Cost	Total Score
Inspecting/Controlling Bio-Organisms	Energy (Electricity) Use	Depletion of a Natural Resource and Degradation of Air	1	5	5	5	16
Air Diffusion	Air Emissions (Odor, VOCs), VOCs Noise, Energy and Fuel Use	Degradation of Air, Nuisance, Depletion of a Natural Resource

Treated Wastewater + | 1 | 5 | 3 | 5 | 14 |
Preventative Maintenance	Solid Waste Generation	Use of Landfill Space	3	3	1	3	10
Monitoring (Oxygen, Odor, Diffusers, Flow)	Energy Use & Supply/Paper Use	Depletion of Natural Resources	1	3	1	3	8
Skimming Floatables	Solid Waste Generation	Use of Landfill Space	1	1	1	1	4
Emergency Generator Operations	Noise, Air Emissions and Fuel Use	Nuisance, Health & Safety, Degradation of Air and Air Emissions and Depletion of a Natural Resource	1	1	1	1	4

So, the total scores range from 4 to 16 in this example. What does this score mean? It means that while all of the environmental impacts are important, some of the impacts have a higher priority of environmental concern than others.

Also consider the total number of operations/activities when you determine how many will become significant in your EMS. For example, if you have 30 operations/activities that you have scored, maybe only the top 5 become significant. Do what makes sense and is reasonable at your facility.

Once you've determined all your aspects and their associated impact scores for the operations/activities within your defined fenceline, you will need to establish a threshold for significance. For example, if we establish 14 as a threshold, then anything with a score of 14 or above would be considered significant.

Make sure that everyone realizes that everything your team determines to be significant (14 and above in our example) will require operational controls in place to minimize or prevent environmental impact (i.e., to show management and control). Refer to the "Next Steps" at the end of the Workbook for more information.

Remember

Conduct a reality check with your EMS Core Team and comments from senior management to reflect the drivers and goals that you have for the EMS.

Also keep in mind that each organization has the flexibility, based on its business, technical, legal, operational, and stakeholder concerns and requirements, to set what it considers a significant threshold value.

Lesson 5 Exercises:

Now it's your turn! To reinforce what we just learned, let's look at our clarifier example. Refer back to operations/activities and the aspect/impact matrix you developed for clarifier operations.

Clarifier Operation/Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)
Monitoring (Flow Balancing, Wastewater Quality, Odor)	Energy Use Supply/Paper Use	Depletion of Natural Resources
Solids and Sludge Control	Wastewater Solids Generation/Disposal	Biosolids Product +
Clarifier (Tank) Cleaning	Energy Use Air Emissions	Depletion of Natural Resources Degradation of Air
RAS and WAS Pumping	Energy/Water Use	Depletion of Natural Resources
Preventative Maintenance	Solid Waste Generation	Depletion of Landfill Space
Wastewater Clarification	Treated Wastewater	Treated Wastewater +

As a team, select 3 criteria from the following list for working through the following exercise, using the aspects/impacts matrix for the clarifier operation.

- Changes to Air, Water and Land
- Impact to Natural Resources
- Regulated
- Cost
- Nuisance
- Stakeholder Impact
- Human Health Impacts

In addition, select the scoring system you would like to utilize.

Go at it! Using the table below, score and sort each of the activities and their aspects/impacts for the wastewater clarifier operation.

Note

For real life examples of an aspect/impact analysis completed by a wastewater facility, including examples where weighting factors were used to determine significance, see Appendix A of the *EMS Wastewater Handbook*.

Clarifier Operation/ Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)	Your criteria 1	Your criteria 2	Your criteria 3	TotalScore
Monitoring (Flow Balancing, Wastewater Quality, Odor)	Energy Use Supply/Paper Use	Depletion of Natural Resources				
Solids and Sludge Control	Wastewater Solids Generation/Disposal	Biosolids Product +				
Clarifier (Tank) Cleaning	Energy Use Air Emissions	Depletion of Natural Resources Degradation of Air				
RAS and WAS Pumping	Energy/Water Use	Depletion of Natural Resources				
Preventative Maintenance	Solid Waste Generation	Use of Landfill Space				
Wastewater Clarification	Treated Wastewater	Treated Wastewater +				

How did your clarifier activities score and rank?

When completing the significance review at your wastewater facility, evaluate your aspects/impacts considering how they score within a particular operation AND how they score across your fenceline. For example, you may consider that the RAS and WAS Pumping activities use a lot of energy. However, consider the energy used for RAS and WAS pumping as compared to biosolids drying. That operation/activity (i.e., biosolids drying) will become your benchmark (5) to score energy impact of all other activities in your wastewater operations analysis.

Appendix B contains a blank significant operations/activities and aspects/impacts scoring table that you can copy and use for the additional operations/activities at your wastewater facility as you complete the aspects/impacts analysis.

When you're satisfied that your process for identifying and ranking your environmental aspects/impacts meets with your wastewater organization's needs, it's time to document the process in a system procedure and verify that it conforms to EMS requirements.

Key Takeaways

- Your wastewater facility has the flexibility to determine the criteria and the method for determining significance, based on your organizational priorities, strategic goals, and priority environmental issues and/or constraints. Consider the approach that best fits your organization and remember to consider technical, business and stakeholder issues as part of your analysis.

- Create cross-functional teams for your review. Include frontline employees from the applicable areas and the environmental department on the team(s) that conduct the aspects analysis.

- Remember, you need to manage (e.g., have operational procedures, records, training, emergency response plans) for whatever your team determines to be a significant aspect.

Lessons 6 & 7) Develop a System Procedure for Identifying Your Environmental Aspects/Impacts AND Check Your Environmental Aspect Identification Procedure for EMS Conformance

Objective: To learn how to develop and evaluate an ISO 14001 conforming environmental aspect systems procedure.

Background: An EMS system procedure clearly defines what you did and will continue to do and it provides a clear guide for ensuring that your EMS is carried out according to your well thought out plans.

STOP Review

Refer back to Section 3: EMS Documents and Records (pages 109 to 116) of the *Handbook* for more information on controlling procedures and other EMS documents.

A procedure generally tells, at a minimum, who will do what, when they will do it, and where the information can be found. EMS procedures also may include a purpose and a scope. Procedures:

- Define the purpose (why the procedure is needed);

- The scope (what fenceline [operations/areas] and staff the procedure applies);

- Roles & responsibilities (who needs to complete the tasks); and,

- The tasks that need to be completed and when they should be completed (e.g., annually, when changes occur in operations or in legal requirements).

Lesson 6 & 7 Exercises:

Now let's walk through our checklist (below), based on the ISO 14001 Standard requirements, for an example procedure to verify if it meets the minimum procedural requirements as well as what should be included in an ***environmental aspect procedure*** as defined above and in the *Handbook* Section 3, page 71. Walking through this checklist will provide your team with a clear picture of what your aspects procedure should cover.

This can be thought of as a "desktop" review.

Note: The aspects system procedure (#1) provided in Appendix C was reviewed to complete the checklist below.

1) Defines the purpose (why the procedure is needed).

Yes ☒ No ☐   Reference/Explanation: Section 1.0 (Purpose) <u>describes the reason for</u> <u>this procedure - "to identify the environmental aspects of its activities, products, and serv-</u> <u>ices" and "to determine those activities and services that can have significant impacts and</u> <u>the environment."</u>

2) Defines the scope (what core fenceline [operations/areas] and staff the procedure applies).

Yes ☐ No ☒   Reference/Explanation: <u>It is not clear what operations/areas (fenceline)</u> <u>the procedure applies to/covers.</u>

3) Explains roles & responsibilities (who needs to complete the tasks).

Yes ☒ No ☐   Reference/Explanation: <u>Section 2.0 (Responsibility and Authority)</u> <u>explains the responsibilities for the EMS Coordinator and the EMS Team for the aspects</u> <u>procedure. In addition, throughout Section 3.0, roles and responsibilities for conducting</u> <u>the aspects analysis are defined.</u>

4) Identifies the tasks that need to be completed.

Yes ☒ No ☐   Reference/Explanation: <u>Section 3.0 (Requirements and Procedures)</u> <u>defines the tasks to be completed for the City's aspects analysis.</u>

5) Contains a good, sound aspect/impact analysis methodology?

Yes ☒ No ☐   Reference/Explanation: <u>Although it can be subjective to state any analy-</u> <u>sis is "good and sound," Section 3.0 outlines the City's tasks to complete the aspects</u> <u>analysis.</u>

6) Includes a list of significant environmental aspects and impacts (or reference to a list)?

Yes ☒ No ☐   Reference/Explanation: <u>Section 4.0 (Related Documents and Data) refer-</u> <u>ences the City's Environmental Aspects List (PO2-R2).</u>

7) Defines a method to review the aspect/impact list at least annually and take into account changes to operations and activities?

Yes ☒   No ☐   Reference/Explanation: <u>Section 3.9 (Updating Aspects and</u> <u>Impacts) explains the process ("At least once per year" and "new or modified activity"</u> <u>for reviewing the City's environmental aspects.</u>

Note

In addition to the general procedural requirements noted above, an environmental aspects procedure should address, at a minimum, the following:

✓   Does it contain good, sound aspect/impact analysis methodology?

✓   Does it include a list of significant environ-mental aspects and impacts (or reference to a list)?

✓   Is the aspect/impact list reviewed at least annually?

✓   Does the procedure take into account changes to operations and activities?

Now it's your turn! Review the aspects system procedure #2 in Appendix C, and using what you just learned, complete the procedure checklist below. Verify that the procedure:

1) Defines the purpose (why the procedure is needed).

Yes ☐ No ☐ Reference/Explanation: _____

_____

2) Defines the scope (what core fenceline [operations/areas] and staff the procedure applies).

Yes ☐ No ☐ Reference/Explanation: _____

_____

3) Explains roles & responsibilities (who needs to complete the tasks).

Yes ☐ No ☐ Reference/Explanation: _____

_____

4) Identifies the tasks that need to be completed.

Yes ☐ No ☐ Reference/Explanation: _____

_____

5) Contains a good, sound aspect/impact analysis methodology?

Yes ☐ No ☐   Reference/Explanation: _____

_____

6) Includes a list of significant environmental aspects and impacts (or reference to a list)?

Yes ☐ No ☐ Reference/Explanation: _____

_____

7) Defines a method to review the aspect/impact list at least annually and take into account changes to operations and activities?

Yes ☐ No ☐ Reference/Explanation: _____

How did you do? Review the completed checklist for procedure in the Lesson 6&7 Answer Key in Appendix A.

Although you will want to use your facilities' standard procedure format, a blank template procedure form has been provided in Appendix B.

Now, get with your Team and draft an aspects system procedure for your wastewater facility.

Key Takeaways

Your wastewater aspects system procedure should document what you actually do (i.e., "do what you say and say what you do").

Lesson 8) Review and Revise Your Environmental Aspects/Impacts

Objective: To build a periodic review and update into your aspects analysis.

Background: Once you have your aspect list in place, determined the significant environmental issues at your wastewater facility and written a procedure to document that it follows the process you implemented, you need to keep the information up-to-date. Using the written procedure you've developed, review your aspect list at least once a year and complete an aspect/impact review when you have any new or changed operations or services that come on-line.

For example, if your wastewater facility is changing from chlorine disinfection to ultra-violet, your cross-functional team (made up of environmental, engineering, disinfection operations, etc.) should review ultra-violet operations/activities as described in the *Handbook* and in this *Workbook* and update your aspects list and significance ranking accordingly.

STOP

Review

Refer to Section 3, Step 8 (page 72) and Appendix A (page 185) of the *Handbook* for information on reviewing and revising your wastewater aspects and impacts and for further review.

Key Takeaways

Your wastewater operations/activities and their associated environmental aspects/impacts will require an annual review in order to verify your activities and aspects/impacts have not changed in environmental impact or importance and to verify the significance of any changes to operations and activities.

Next Steps

Congratulations! You've just completed an aspects/impacts and significance review of your wastewater facility, one of the main steps in an environmental management system. So what's next?

Remember, every environmental aspect you determine to be significant (above the threshold you established) will require you to verify current controls (e.g., procedures, work instructions, training) or to implement new or additional controls to manage your significant environmental issues. In addition, it's time to set some goals for improving your organization's environmental footprint. Setting objectives and targets presents an opportunity to identify where you want to be in the next year or two regarding your significant aspects. For more information, review Section 3: Objectives & Targets and Environmental Management Programs (pages 75-89) and Operational Control (pages 117-121) in the *Handbook*.

The diagram below also represents your wastewater facilities' next steps. Note that whether you chose to set objectives and targets or manage your significant environmental issues, you must establish operational controls for ALL activities/operations that you determined to be the most significant within your EMS fenceline.

Figure 6: Significant Environmental Aspects: What's next?

Your Step-by-Step Guide to Identify and Prioritize Your Environmental Aspects

> **Step 1: Clarify EMS Jargon with Your Team**

↓

> **Step 2: Confirm Your EMS "Fenceline"**

↓

> **Step 3: Construct Input/Process/Output Diagrams for all activities and operations within Your EMS Fenceline**

↓

> **Step 4: Develop a List of Your Environmental Aspects and Impacts**

↓

> **Step 5: Prioritize Your Environmental Aspects and Impacts**

↓

> **Steps 6&7: Develop a System Procedure for Identifying Your Environmental Aspects/Impacts AND Check Your Environmental Aspect Procedure for EMS Conformance**

↓

> **Step 8: Review and Revise Your Environmental Aspects/Impacts**

Appendix A

Answer Key for Lessons 1, 3, 4, 6 & 7

Lesson 1:
Clarifying EMS Jargon—
Exercises A, B & C

Lesson 3:
Completed Aeration Basin and
Clarifier Input/ Process/Output
Diagrams

Lesson 4:
Aeration Basin Aspect/Impact Table;
List of Clarifier Operations/ Activities;
and Clarifier Aspect/Impact Table

Lesson 6&7:
Aspects System Procedure #2

Appendix A

A. Indicate which of the following terms is an operation/activity, aspect, or impact.

Answers

1) Air pollution
2) Burning diesel fuel
3) Digester Operations
4) Operating/Maintaining Backup Generators
5) (Electrical) energy consumption
6) Water consumption
7) Herbicide Application
8) Burning bio-diesel fuel
9) Spilled Solvent

1) Impact
2) Aspect – Driving a truck is the Activity
3) Operation/Activity
4) Operation/Activity
5) Aspect
6) Aspect
7) Operation/Activity
8) Aspect
9) Aspect or None – Potential spill is an aspect; contamination of workers is an Impact

10) Recycling Program
11) Cleaning Spills
12) Degradation of water quality
13) Generation of solid waste
14) Designing construction specifications
15) Restoring natural resources
16) Air emissions
17) Steam cleaning
18) Depletion of landfill space
19) Purchasing supplies
20) Contamination of ground water

10) Operation/Activity
11) Operation/Activity
12) Impact
13) Aspect
14) Operation/Activity
15) (Positive) Impact
16) Impact
17) Operation/Activity
18) Impact
19) Operation/Activity
20) Impact

B. Indicate which of the following wastewater specific terms is an operation/activity, aspect, or impact.

Answers

1) Odors
2) Receiving and Transporting Chemicals
3) Biodiesel Fuel Use
4) Reduction in Landfill Space
5) Maintaining Operations Buildings
6) Solid Waste Generation
7) Biosolids (Beneficial Product +)
8) Reduction in Natural Resources
9) Biodegradable Chemical Use (+)
10) Chlorine Disinfection

1) Aspect
2) Operation/Activity
3) Aspect
4) Impact
5) Operation/Activity
6) Aspect
7) (Positive) Impact
8) Impact
9) (Positive) Aspect
10) Operation/Activity

C. Indicate which of the terms below are operations/activities and then designate their corresponding aspects and impacts.

Operation/Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)
Biosolids Land Application	Odor, Dust, Runoff	Degradation of Air, Land or Water and Public Complaints
Receiving and Transporting Chemicals	Spills and Leaks	Air, Soil and Groundwater Contamination
Maintaining Operations Buildings	Solid Waste Generation (e.g., Rags, Supplies)	Reduction in Landfill Space
Aerobic Digestion	Odors	Nuisance
Biosolids Land Application	Sludge Reuse	Beneficial Product +

Lesson 3 Exercises Answer Key

Inputs	Processes	Outputs

Materials or Resources

Wastewater from Preliminary Treatment
Return Sludge from Clarifiers
Wastewater Organisms
Air from Blowers
Parts, Equipment & Supplies
Fuel (For Equipment Used in Cleaning/
   Skimming and Emergency Generators)
Energy (Electricity) Use
Labor

Aeration Basin
Air Diffusion
Inspecting/Controlling Bio-Organisms
Preventative Maintenance
Monitoring (Oxygen, Odor, Diffusers, Flow)
Skimming Floatables

Products or Services

Treated Wastewater to Clarifiers

Wastes Out

Air Emissions (Odor)
Air Emissions (VOCs)
Failed Equipment (e.g., diffusers, hoses, cables)
Solid Waste (e.g., Wastewater Solids, General Trash, Rags, Paper and Fluids from Monitoring and Maintenance)
Noise (from Air Blowers and Emergency Generators—as Needed)

Inputs	Processes	Outputs

Materials or Resources

Wastewater from Aeration Basins
Parts, Equipment & Supplies
Sludge
Electricity
Labor

Clarifier Operation
Monitor (e.g., Flow Balancing, Wastewater Quality & Odor)
Solids & Sludge Control
Clarifier (Tank) Cleaning
RAS & WAS Pumping
Preventative Maintenance

Products or Resources

Treated Wastewater to Disinfection System

Wastes Out

Solid Waste
  (e.g., Wastewater Solids, General
   Trash, Rags, and Fluids from Monitoring and Maintenance)

Lesson 4 Exercises Answer Key

Aeration Basin peration/Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)
Air Diffusion	Air Emissions (VOCs)	Degradation of Air
	Air Emissions (Odor)	Nuisance
	Noise	Nuisance
	Energy Use	Depletion of Natural Resources
	Fuel Use	Depletion of a Natural Resource
		Treated Wastewater +
Inspecting and Controlling Bio-Organisms	Energy (Electricity) Use	Depletion of a Natural Resource
		Degradation of Air
Preventative Maintenance	Solid Waste Generation	Use of Landfill Space
Monitoring (Oxygen, Odor, Diffusers, Flow)	Energy (Electricity) Use	Depletion of a Natural Resource
	Supply/Paper Use	Depletion of Natural Resources
Skimming Floatables	Solid Waste Generation	Use of Landfill Space
Emergency Generator Operations	Noise	Nuisance and Health & Safety
	Air Emissions	Degradation of Air
	Fuel Use	Air Emissions and Depletion of a Natural Resource

Note: Aeration Basin Operations (Air Diffusion Treatment) can also be thought of as a Positive Impact and designated with a "+"

List of Clarifier Operations/Activities

- Monitor (e.g., Flow Balancing, Wastewater Quality and Odor)
- Solids and Sludge Control
- Clarifier (Tank) Cleaning
- RAS and WAS Pumping
- Preventative Maintenance

Lesson 4 Exercises Answer Key, continued

Clarifier Operation/Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)
Monitoring (Flow Balancing, Wastewater Quality, Odor)	Energy Use Supply/Paper Use	Depletion of Natural Resources Depletion of Natural Resources
Solids and Sludge Control	Wastewater Solids Generation/Disposal	Biosolids Product +
Clarifier (Tank) Cleaning	Energy Use Air Emissions	Depletion of Natural Resources Degradation of Air
RAS and WAS Pumping	Energy Use Water Use	Depletion of Natural Resources Depletion of Natural Resources
Preventative Maintenance	Solid Waste Generation	Depletion of Landfill Space
Wastewater Clarification	Treated Wastewater	Treated Wastewater +

Lesson 6 & 7 Exercises Answer Key

Answers for the aspects system procedure #2 (in Appendix C)

Does the procedure:

1) Define the purpose (why the procedure is needed).
Yes ☐ No ☒
Reference/Explanation: The procedure does not describe the purpose of the aspects procedure. E.g., "The purpose of this procedure is to identify the significant environmental aspects of ABC activities in order to set objectives and targets for the ABC EMS.

2) Define the scope (what core fenceline [operations/areas] and staff the procedure applies).
Yes ☒ No ☐
Reference/Explanation: Section 1.0 (Scope) defines that the procedure applies to all ABC activities, including from internal and external (supplier) sources that ABC can control.

3) Explain roles & responsibilities (who needs to complete the tasks).
Yes ☐ No ☒
Reference/Explanation: There are no clear explanation of roles and responsibilities in the procedure (e.g., who is doing what by when, etc.).

4) Identify the tasks that need to be completed.
Yes ☒ No ☐
Reference/Explanation: Section 3.0 (Approach) outlines the approach that ABC will use to determine and rank the environmental significance of their activities.

5) Contain a good, sound aspect/impact analysis methodology?
Yes ☒ No ☐
Reference/Explanation: Although it can be subjective to state any analysis is "good and sound," Section 3.0 (Approach) outlines ABC's tasks to complete the aspects analysis.

6) Include a list of significant environmental aspects and impacts (or reference to a list)?
Yes ☒ No ☐
Reference/Explanation: Section 4.1 under 4.0 Documents/Records references a "table listing all of ABC's activities, products and services; their associated environmental aspects; and their associated potential environmental impacts."

7)Is the aspect/impact list reviewed at least annually and take into account changes to operations and activities?
Yes ☒ No ☐
Reference/Explanation: Section 3.8 outlines that ABC will complete a review as outlined in Section 3.0 as "a new activity, product or service is initiated at ABC." In addition, the last paragraph of Section 3.0 states that the procedure will be applied no less than once per year.

EMS Aspects Workbook

Appendix B

Conforming Your EMS Fenceline

List of Operations/Activities

Input/Process/Output Diagram

Operations/Activities and Aspects/Impacts Matrix

Significant Operations/Activities and Aspects/Impacts Table

Template Procedure Form

Step-by-Step Guide to Identify and Prioritize Your Environmental Aspects

Lesson 2: Confirming your EMS Fenceline

Where will your EMS provide the most bang for your buck (i.e., the "low-hanging fruit")? What organizational benefits and environmental performance improvements do you expect the EMS provide?

_____

_____

Where in the organization are there opportunities to leverage things that are going well and best practices?

_____

_____

What areas in your organization give you the most heartburn at the moment? How will the EMS help improve management confidence in these areas?

_____

_____

Where do you use the most natural resources? Energy? Hazardous materials?

_____

_____

Which areas have the most support and/or interest? Receptive management? Line supervisors? Employees?

_____

_____

Have you estimated the Level of Effort that will be required from employees in the identified fenceline areas?

_____

_____

Have you discussed human and financial resource needs with appropriate levels of management in your fenceline areas?

_____

_____

Appendix B

Input/Process/Output Diagram

Inputs

Materials or Resources →

Processes

Operation/Activity

Outputs

Products or Services →

Wastes Out →

List of Operations/Activities

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____
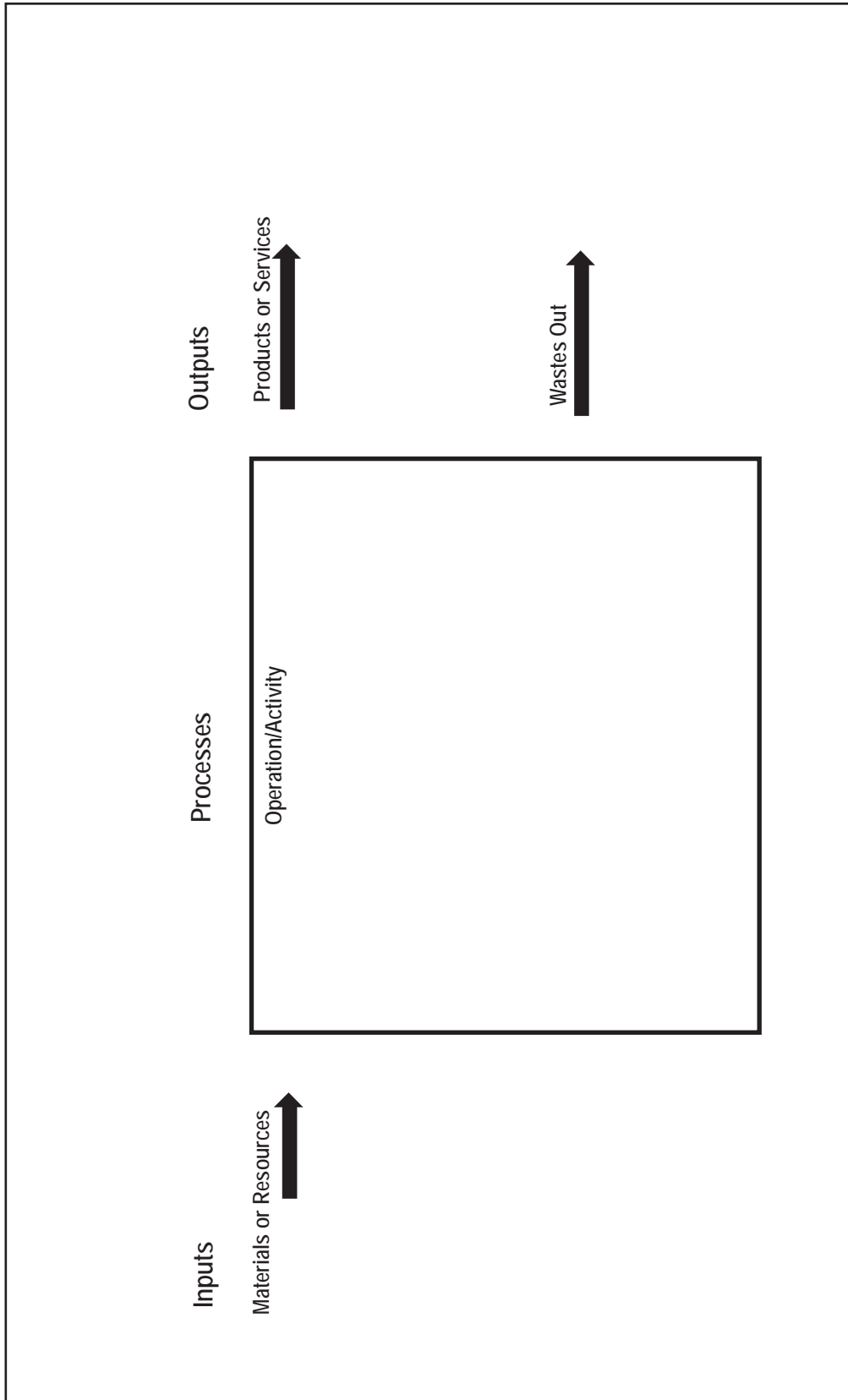
Significant Operations/Activities and Aspects/Impacts Table

Wastewater Operation/Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)				Total Score

Wastewater Operation/Activity	Aspects (Causes of Impact)	Effects (Potential Impacts)				Total Score

EMS Aspects Workbook

Template Procedure Form

Identifying Significant Environmental Aspects System Procedure

1.0 Purpose

2.0 Scope

3.0 Roles & Responsibilities

4.0 Approach

5.0 Documents/Records

Your Step-by-Step Guide to Identify and Prioritize Your Environmental Aspects

Step 1: Clarify EMS Jargon with Your Team

↓

Step 2: Confirm Your EMS "Fenceline"

↓

Step 3: Construct Input/Process/Output Diagrams for all activities and operations within Your EMS Fenceline

↓

Step 4: Develop a List of Your Environmental Aspects and Impacts

↓

Step 5: Prioritize Your Environmental Aspects and Impacts

↓

Steps 6&7: Develop a System Procedure for Identifying Your Environmental Aspects/Impacts AND Check Your Environmental Aspect Procedure for EMS Conformance

↓

Step 8: Review and Revise Your Environmental Aspects/Impacts

EMS Aspects Workbook

Appendix C

EMS Aspects Procedures 1 & 2

Appendix C

Environmental Management System Significant Aspects Procedure #1

1.0 Purpose

The purpose of this procedure is to describe a consistent method by which the City identifies the environmental aspects of its activities and services. The primary purpose of this procedure is to determine those activities and services that can have significant impacts on the environment, and to ensure that these activities and impacts are considered in setting environmental objectives.

2.0 Responsibility and Authority

The EMS Coordinator, or designee, and the EMS Team are responsible for developing, undertaking, and implementing the procedure of identifying the environmental aspects and impacts of the activities and services of the City Departments and Divisions (referred to as fencelines) are included in the EMS. The results of this identification process will be summarized in an organizational matrix of activities and services with their related environmental aspects and impacts. This procedure is described in greater detail in Section 5.0 "Requirements and Procedures."

The EMS Coordinator, or designee, and the EMS Team are responsible for establishing the significance criteria to be used in rating the identified aspects and impacts and for ranking them with respect to the significance criteria.

The EMS Coordinator, or designee, and the EMS Team are responsible for performing an annual review of and, if necessary, updating the aspects/impacts matrix and the associated significance ranking.

3.0 Requirements and Procedures

The procedure by which the City identifies the environmental aspects and impacts of its activities and services will be conducted for each fenceline (i.e., site or operational boundary) as it joins the City's EMS program. For each application, the procedure will consist of the following steps, also presented in P02-R2, Aspects/Impacts Identification and Assessment Diagram:

3.1 Identifying Key Operations

The EMS Coordinator and the EMS Team will hold a series of meetings in which a compendium of the major operations undertaken within the subject fenceline will be compiled. This summary listing will be referred to as "key operations" and is subsequently broken down into smaller, more specific activities related to that key operation. This overall organizational diagram serves as the basis for the remaining steps in the procedure.

3.2 Input/Output Diagrams

The EMS Coordinator and the EMS Team then address each key operation individually by creating Input/Output Diagrams that detail all the resources that are used, all the waste and by-products that are produced, and all the services that are provided in the course of performing each key operation. These diagrams will assist in the following steps by providing a clear overview of the operations and

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activities being further examined. See P02-R3 for an Input/Output Diagram Template.

3.3 Activities

The EMS Coordinator and the EMS Team will then compile a listing of all the activities that together comprise a particular key operation. Every activity, large and small, is listed in a table designed for the purpose. See P02-R4 for an Activities, Aspects, Impacts, Significance Criteria Template. In some cases, certain activities may have several different components, but are always specific to the key operation the team is addressing.

3.4 Environmental Aspects and Impacts

After the list of activities is fully compiled for a particular key operation, the EMS Coordinator and the EMS Team address each activity individually. For each activity, the environmental aspect(s) is listed. Some activities have multiple corresponding aspects, and some have only one. The resulting environmental impact(s) are then listed in correspondence with the appropriate aspects.

In conducting this step, it is important to remember that the aspect is the element of the activity or service that interacts with the environment document while the impact describes the change to the environment (Note: an impact can be either a positive or a negative change). Potential impacts to be considered include:

- changes to air, soil, and water quality;
- human exposure to chemical or harmful agents;
- changes to natural habitat;
- nuisances;
- depletion of resources.

3.5 Regulatory Status

After each aspect in the table, a notation (Yes or No) is made as to whether or not the aspect is regulated under existing legal requirements.

3.6 Significance Criteria

The EMS Coordinator and the EMS Team select the significance criteria. This step in the procedure is conducted only once as the same significance criteria are to be applied to each Key Operation within the subject fenceline and eventually to each fenceline within the City as they are incorporated into the EMS. A list of fourteen different significance criteria divided into environmental/sustainability-related and business-related categories was reviewed and voted on by the EMS Coordinator and the EMS Team. From this vote the list of significance criteria was reduced to seven areas of concern. See P02-R5 for a listing of selected significance criteria.

3.7 Environmental Aspect Significance Ranking

In order to identify which environmental aspects and their associated impacts are to be considered significant, the EMS Coordinator and the EMS Team review

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each aspect of every activity in relation to the selected significance criteria. A rating on a scale from zero to five (with zero representing no impact and five representing a major impact) will be assigned to each significance criteria as it relates to each aspect. The Core Team will assign this rating to each aspect using their best professional judgment, knowledge of the activities they are evaluating, and with the input of additional knowledgeable staff, as needed.

3.8 Determining Significance

Once the ranking of aspects is completed, the significance scores are totaled. A threshold value is selected, at or above which the associated aspects are to be considered of high significance in light of its regulated status and the City's environmental policy as well as improvable within technical, financial, and organizational constraints. The list of significant aspects resulting from this procedure will be maintained as P02-R-XX (Dept. Abbreviation).

3.9 Updating Aspects and Impacts

At least once per year, the EMS Coordinator and the Core Team will evaluate new or modified activities and their associated aspects and impacts. Depending on the complexity of the activity, an Input/Output Diagram may be generated. The subsequent steps, including the identification of environmental aspects and impacts related to the new or modified activity and the significance rating will be conducted. If a significant aspect is identified, it will be added to the overall listing generated from Step 5.7, Determining Significance. The Team will also consider the significance criteria used in the rating exercise and evaluate any need to alter them.

4.0 Related Documents and Data

P02-R1 ISO 14001 Standard Excerpt 4.3.1

PO2-R2 Environmental Aspects List

P02-R3 Aspects/Impacts Identification and Assessment Diagram

P02-R4 Input/Output Diagram Template

P02-R5 Activity, Aspect, Impact, Significance Criteria Table Template

P02-R6 Significance Criteria

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EMS Aspects Workbook

Identifying Significant Environmental Aspects Procedure #2

1.0 Scope
This procedure is applied to all activities, products and services that are internal to and under the control of ABC. It is applied equally to those aspects at ABC that originate from external sources.

2.0 Definitions
Environmental aspect: Element of an activity, process or service that can interact with the environment. The environmental aspect of an activity is that part of it that creates a possibility for an environmental impact. As such, it is equivalent to the concept of a "hazard" in safety, which is also defined as the mere possibility of a negative event.

Significant environmental aspect: An environmental aspect that has or can have a significant environmental or business impact, i.e., one that can potentially cause a significant environmental or operational impact.

Environmental impact: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from the facility's activities, products or services. A potential negative environmental impact is equivalent to the concept of "risk" in safety, which assigns a probability and consequence to the possible negative event that may result from a "hazard".

3.0 Approach
The approach enumerated below reflects the method developed in Module 1, Significant Aspects, Objectives and Targets of US EPA's Environmental Management System Implementation Training Course. That training module is incorporated here by reference and represents a further elaboration of the approach used by ABC to identify its significant environmental aspects. The approach below is a very condensed version of the contents of the training module.

3.1 Create a baseline list of ABC activities, products, and services that have the possibility of interacting with the environment, (e.g., possess environmental aspects) together with their environmental aspects.

3.2 Using the baseline list, aggregate all activities, products and services by environmental aspect.

3.3 For each of these aspects, state the potential environmental impact by highlighting the probability and consequence of the aspect's occurrence.

3.4 Ascertain the regulatory or other requirements that may pertain to a given aspect when considered together with each activity, product or service it is associated with and note each combination that has a regulatory or other requirement. Those aspects that are so highlighted are designated as significant aspects. Document the regulatory and other requirements that apply to each aspect.

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3.5 Establish significance criteria for potential impacts by establishing levels for probability and consequence that fall into low, medium and high levels.

3.6 Compare the potential environmental impacts against the significance criteria to determine which aspects should be designated as significant. Where a potential environmental impact meets or surpasses the minimum criteria for designating as "significant", then its associated aspect is considered significant.

3.7 Create a final list of all significant aspects that have been so designated either because they have regulatory or other requirements that make them so or because they meet or surpass the significance criteria established for the ABC.

3.8 Whenever a new activity, product or service is initiated at ABC, the requirements of this procedure will be applied to it to ascertain if any new significant environmental aspects have been introduced.

3.9 This procedure is also applied to activities, products and services at ABC that originate from external sources (e.g., suppliers). Significant environmental aspects on ABC premises that originate from such sources shall be managed like all other significant environmental aspects. ABC may take steps to notify those external parties over which it has some influence to mitigate any aspects that may reasonably be mitigated at the source. Where no such influence exists or where mitigation at the source is infeasible, ABC will address such aspects within its own EMS.

This procedure will be applied as necessary to ensure the EMS addresses all significant aspects but not less than once per year to maintain the list's relevance.

4.0 Documents/Records

4.1 A table listing all of ABC's activities, products and services; their associated environmental aspects; and their associated potential environmental impacts. The table is split into significant and non-significant impacts and grouped by aspect. Aspects with regulatory or other legal requirements are noted as such.

4.2 Documentation of the method used to ascertain which environmental aspects are significant.

4.3 Documentation of any legal and other requirements for significant environmental aspects.

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Appendix D

Senior Management Commitment and Roles Defined

Senior Management Commitment and Roles Defined

Appendix D

December 19, 2005

Re: Authority for EHS-MS activities

Under the authority delegated to me on January 14, 2003 by the Kent County Levy Court, I am delegating the following Environmental Health and Safety Management System (EHS-MS) as follows.

The Environmental Program Manager shall:

- Develop all procedures associated with the EHS-MS;

- Lead the Core Team;

- Participate in the appropriate biosolids value chain activities;

- Conduct internal audits and compliance assessments under the EHS-MS; and

- Report on the performance of the EHS-MS to all interested parties.

The Core Team shall be composed of all department managers with EHS-MS responsibility. The Core Team shall have the following responsibilities:

- Approve all EHS-MS documents;

- Ensure that the EHS-MS is implemented, maintained and continually improved within the plant;

- Conduct periodic management reviews;

- Determine the direction of the EHS-MS;

- Determine the resources necessary to operate, maintain and continually improve the EHS-MS; and

- Conduct all management of change processes.

Hans Medlarz, P.E.
Public Works Director
Kent County, DE