

*Improving Performance Through
Environmental Management Systems (EMS):*

Third EMS Initiative for Public Entities



Final Report

January 2003 – December 2004



This effort was made possible through a cooperative agreement
between the Global Environment & Technology Foundation and the
U.S. Environmental Protection Agency Office of Water.

Acknowledgements

This document was developed under Cooperative Agreement Number #82807101 awarded by the U.S. Environmental Protection Agency (U.S. EPA) to the Global Environment & Technology Foundation (GETF). U.S. EPA made comments and suggestions on the document intended to improve the technical accuracy, along with other editorial comments. These comments are included in the document. However, the views expressed in this document are those of GETF and U.S. EPA does not endorse any products or commercial services mentioned in this publication.

The following individuals were involved with the development of this report:

Global Environment & Technology Foundation (www.getf.org)

Hank Habicht hhabicht@getf.org	Noeleen Tillman ntillman@getf.org
Faith Leavitt fleavitt@earthvision.net	Nick Martin nmartin@getf.org
Scott Christian schristian@getf.org	

GETF gratefully acknowledges the following people for their invaluable contributions to the design and content of this report.

U.S. Environmental Protection Agency (www.epa.gov/ems)

Jim Horne	Office of Water	horne.james@epa.gov	202-564-0571
-----------	-----------------	--	--------------

Peer Local Resource Centers (www.peercenter.net/whocanhelp/lrc)

University of Florida TREEO Center www.treeo.ufl.edu/ems	William Engel bengel@treeo.doce.ufl.edu	352-392-9570
Virginia Tech COTA Program http://www.cota.vt.edu/vtems/	Doug Dean ddeanpe@matrixcompliance.com	352-377-9070
Zero Waste Alliance www.zerowaste.org/lrc	Bob Herbert bherbert@vt.edu	540-853-8276
	Larry Chalfin lchalfan@zerowaste.org	503-279-9383
	Jeff Omelchuck jeff@iqa.com	503-574-3346
	Dorothy Atwood Datwood99@comcast.net	503-279-9383

Project Participants

City of Charlottesville (VA)	Kristel Riddervold riddervold@charlottesville.org	434-970-3631
City of Kansas City (MO)	Larry Falkin larry_falkin@kcmo.org	816-513-3456
Clark County (WA)	Peter DuBois pete.dubois@clark.wa.gov	360-397-6118
Kent County (DE)	Jim Newton james.newton@co.kent.de.us	302-335-6000
Metro Waste Authority (IA)	Beth Shonts bsh@mwatoday.com	515-244-0021
Oakland County (MI)	Sherri Gee gees@co.oakland.mi.us	248-858-0108
Orange County Convention Center (FL)	Brenda Brown brenda.brown@occc.net	407 685-5955
Rivanna Authority (VA)	Anne Bedarf abedarf@rivanna.org	434-977-2970
Sacramento Municipal Utility District (CA)	Stu Husband shusban@smud.org	916-732-6246

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

*Jim Horne
National Program Manager
U.S. EPA - Headquarters
(202) 564-0571
horne.james@epa.gov*

*Nick Martin
Program Manager
Global Environment & Technology Foundation
(703) 379-2713
nmartin@getf.org*

Table of Contents

Why did U.S. EPA Fund this Initiative?	4
Background and Project Structure	4
What is an EMS?	6
The EMS Implementation Phases	7
Drivers –Why Did Participants Choose to Implement an EMS?	8
Key Benefits Participants Achieved from Adopting an EMS	9
Keys to Successful EMS Implementation	10
EMS Implementation Status of Participants in this Initiative	12
Organizational Resources Committed	13
Participant Profiles	21
Appendix A: Glossary of EMS Terms	75
Appendix B: Summary of Implementation Phases and Workshops	79
Appendix C: Management Roundtable Summary	96
Appendix D: Additional EMS Information	102

Introduction

The Environmental Management System (EMS) Initiatives for Local Governments program began in 1997 with the first of three EMS implementation programs. The first two initiatives involved 23 local government participants with the aim of better understanding the applicability and benefit of an EMS on environmental performance, compliance, pollution prevention and stakeholder involvement in local government operations. Data and information generated throughout the initiatives clearly demonstrated that an EMS is applicable to local government operations. The experiences of these organizations were documented in two published final reports entitled *Final Report: The U.S. EPA Environmental Management System Pilot Program for Local Government Entities 1997-1999* and *Final Report: 2nd EMS Initiative for Government Entities 2000-2002*. The full reports are available at www.peercenter.net.

The following report details the experiences of nine organizations that participated in the 3rd EMS Initiative for Public Entities from January 2003 – December 2004.

Why did U.S. EPA Support the Third EMS Initiative?

The U.S. Environmental Protection Agency's (U.S. EPA) support for the voluntary adoption of EMSs has been evident since the mid-1990s. This support has taken the form of various EMS initiatives such as the National Biosolids Partnership and the EMS Initiative for Local Governments (August 1997 – July 1999 and April 2000 – March 2002). U.S. EPA has also released various policy documents outlining its support for EMSs and the steps it will take to promote its adoption. In 1999 U.S. EPA issued a report entitled *Aiming for Excellence: Actions to Encourage Stewardship and Accelerate Environmental Progress*. The report states that “as a matter of policy, U.S. EPA will promote and encourage the use of EMSs that help improve compliance, pollution prevention, and other measures of environmental performance.” To accomplish these initiatives, U.S. EPA issued its *Action Plan for Promoting the Use of Environmental Management Systems* in August 2001. In May 2002, U.S. EPA expanded upon these efforts by stating their own commitment to implement EMSs among U.S. EPA's employees, operations and facilities by signing into effect *U.S. EPA's Environmental Management System Implementation Policy*.

The positive results from the first two EMS Initiatives for Local Governments generated Federal and local government support for the 3rd *EMS Initiative for Public Entities* project, which commenced in January 2003. Supported by the U.S. EPA's Office of Water, the Third Initiative leveraged the wealth of information and tools resulting from the first two pilot projects and looked to further test the applicability of EMS within a wide-range of sectors. This initiative included nine participating organizations.

Background and Project Structure

The Global Environment & Technology Foundation (GETF) was once again selected by U.S. EPA to lead the initiative and provide technical EMS implementation support. GETF, a 501-[c] [3] not-for-profit organization (www.getf.org), provides EMS training and technical assistance to

numerous private and public sector organizations. Building on these capabilities and the experience of the twenty-three prior participants from the first two initiatives, GETF provided participants with training, technical assistance and tools needed to effectively implement their organization's EMS over the two-year period.

GETF used a recruitment process similar to that utilized in the first two initiatives. The third initiative was officially publicized by U.S. EPA through Federal Register Notice Volume 67, Number 162 on August 21, 2002. Participants were evaluated based upon selection criteria generated from keys to success and lessons learned from implementation experiences and participant feedback in the first two initiatives. Candidates were evaluated against each of the six selection criteria listed below:

- Top management commitment
- Resources and organizational support
- Communication – internal and external
- Proposed EMS Fenceline
- Knowledge and understanding of EMS
- Synergy with existing programs

In addition, the participants were asked to commit to the regular collection of critical EMS implementation data that could be shared publicly at the conclusion of the project. Based upon this selection process, the following nine organizations were selected to participate in the Third EMS Initiative:

Public Entity Participant	EMS Fenceline
City of Charlottesville, VA	Parks and Recreation Division
City of Kansas City, MO	Household Hazardous Waste and Solid Waste Divisions
Clark County Department of Public Works - Vancouver, WA	Equipment Services Department
Kent County Department of Public Works - Dover, DE	Wastewater Treatment Facility
Metro Waste Authority - Des Moines, IA	Landfill and Regional Collection Center
Oakland County Drain Commissioner's Office - Waterford, MI	Wastewater Treatment Plant Complex
Orange County Convention Center - Orlando, FL	Building Services and Waste Management
Rivanna Water and Sewer Authority - Charlottesville, VA	Moore's Creek Wastewater Treatment Plant
Sacramento Municipal Utility District - Sacramento, CA	Energy Supply Business Unit

What is an EMS?

An environmental management system, or EMS, is a set of management processes and procedures that allow 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 public and private sectors. An EMS encourages an organization to continuously improve its environmental performance.

EMS Basic Elements:

- Reviewing the organization's environmental goals
- Analyzing its environmental impacts and legal requirements
- Setting environmental objectives and targets to reduce environmental impacts and comply with legal requirements
- Establishing programs to meet these objectives and targets
- Monitoring and measuring progress in achieving the objectives
- Ensuring employees' environmental awareness and competence
- Reviewing progress of the EMS and making improvements

An EMS helps organizations address their regulatory demands in a systematic and cost-effective manner. This proactive approach can help reduce the risk of non-compliance and improve health and safety practices for employees and the public. An EMS can also help address non-regulated issues, such as energy conservation, and can promote stronger operational control and employee stewardship. In addition, the EMS implementation process often reveals operational efficiency opportunities originally not considered. This process can occasionally uncover potentially serious, yet undisclosed, violations or dangerous working conditions as well as opportunities for significant cost savings and opportunities to go beyond compliance for improved environmental performance.

Methodology

EMSs follow Shewart and Deming's well-known model of *Plan-Do-Check-Act* which is a systems methodology rather than the traditional command and control approach. Personnel evaluate the processes and procedures they use to manage environmental issues and incorporate strong operational controls and environmental roles and responsibilities into existing job descriptions and work instructions. They set objectives and targets for managing their environmental issues. They monitor, measure and evaluate their progress in environmental performance both in areas that are regulated and areas that are not.

The EMS integrates environmental considerations into everyday business operations, and environmental stewardship becomes part of the daily responsibilities for everyone across the entire organization, not just in the environmental department. EMSs provide a number of benchmarked tools to manage environmental risk effectively and offer great potential for continuous improvement in compliance and other areas of environmental performance.

Not a substitute for regulatory requirements

An EMS is not intended to be a substitute for regulatory requirements nor does it offer regulatory relief from the law. EMSs can improve an organization's compliance, pollution prevention and overall environmental performance and hopefully build greater confidence with local stakeholders. EMSs are proactive programs that identify and address the root causes of potential compliance problem areas. Senior management plays an active role in the EMS, monitoring and measuring the organization's progress toward its environmental goals, and continually looking for ways to improve environmental management.

EMS Baseline/Framework

The most commonly used framework for an EMS is the one developed by the International Organization for Standardization (ISO) for the ISO 14001 standard (1996). The participants in the Third Initiative utilized the 2004 Standard, which was finalized by ISO during the project period.

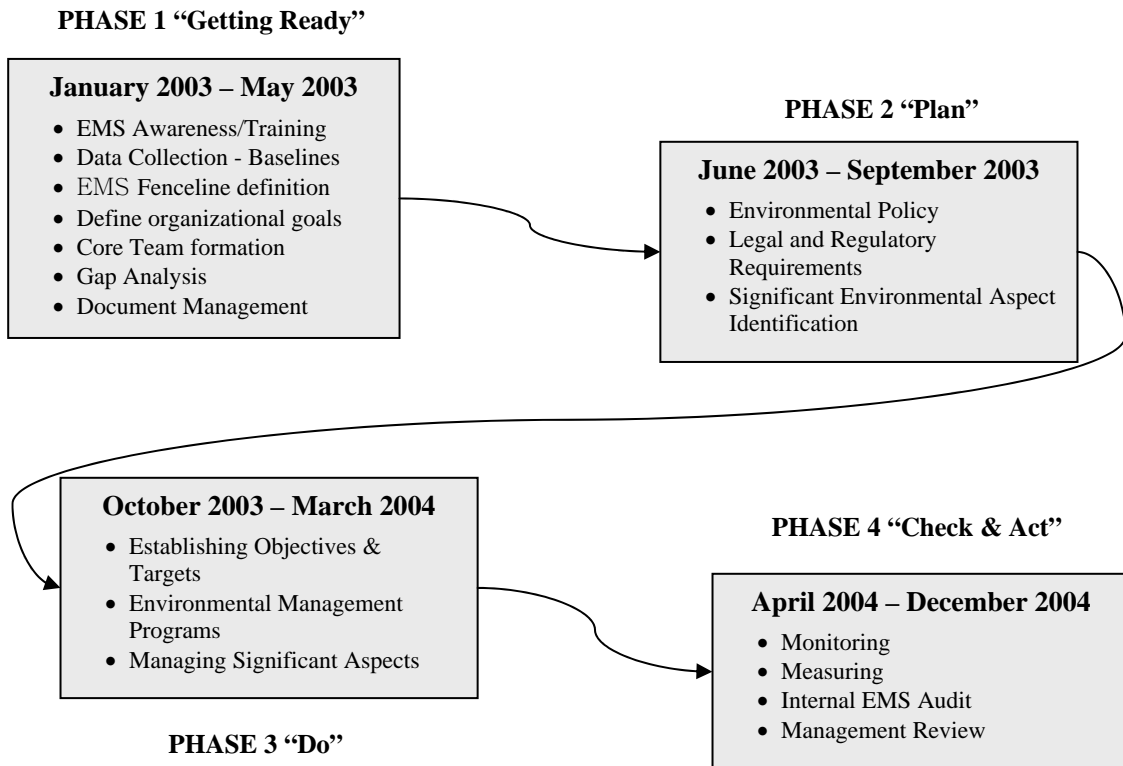
The EMS Implementation Phases

GETF structured the initiative so that the participants developed and implemented the EMS in four phases. At the beginning of each phase the participants convened for a workshop where they received intensive training for 2 ½ days that was specific to the EMS elements for each particular phase. The goal of each training session was to prepare the participants, upon returning to their respective organizations after each workshop, to train and lead their EMS Implementation Teams through the completion of the EMS requirements. This model is similar to the one used by GETF in the first and second initiatives, but adjusted based upon lessons learned and suggestions from past participants.

Monthly all-hands conference calls were conducted to discuss issues specific to the implementation phase. The calls served as a forum where participants could share their keys to success, how to overcome challenges and brainstorm on specific issues. GETF also used the calls to discuss project logistics. GETF conducted biweekly technical assistance calls with the individual participants. These calls were an opportunity for GETF to interact with each participant one-on-one to discuss specific challenges or issues, provide technical assistance and feedback on work generated, and to discuss the status of the implementation process. In addition, GETF was available to provide guidance and technical assistance on an *ad-hoc* basis.

GETF leveraged much of the information and documentation that was generated by the participants from the first and second initiatives to refine the training approach and provide document samples and materials and real-time examples for the new participants. GETF also included information generated by other local governments that have implemented an EMS. Participants found the sample documents (e.g. procedures, environmental policies, and work instructions), which were provided at the start of each phase, were found particularly useful. In addition, representatives from organizations outside the program that have implemented EMSs attended each workshop to share their experiences and insights on the implementation process, allowing participants to build mentoring relationships with EMS practitioners throughout the

country. Many of the project participants found the mentoring provided by these organizations to be an invaluable resource in both overcoming hurdles and challenges as well as in streamlining their efforts to implement the EMS through the sharing of experiences, approaches, and tools.



Drivers –Why Did Participants Choose to Implement an EMS?

The results of the first two initiatives demonstrated that EMSs are applicable to local governments. Local governments outside the scope of these initiatives have also seen and reported on the value of implementing an EMS, which has resulted in a steady increase over the past few years in the number of local governments with EMSs. As this number continues to grow so does the evidence that EMS is a tool that can benefit local governments in a number of ways.

“With our organization located within a university area, we have external stakeholders that are very knowledgeable and interested in the way we do business. Therefore, the City felt strongly that they wanted to step forward and be the environmental leader within the community and EMS implementation is the logical step”.

-Pat Plocek, Parks Division Manager, Charlottesville, VA

There are many reasons why local government organizations choose to implement an EMS. Some want greater assurance in maintaining regulatory compliance or see the EMS as a tool to help them remain competitive with private industry. Others have wanted to

display a greater attentiveness to environmental issues, often following an incident that came to the public's attention. At the beginning stages of the third initiative, participants cited the following motivations for EMS implementation:

- Improve employee participation in the organization's environmental performance
- Improve environmental performance
- Consistent with the organization's overall environmental principles
- Valuable public relations tool
- Operational efficiencies and reduced costs

Key Benefits Participants Achieved from Adopting an EMS

The participants realized many benefits over the course of the project, many of which were quite similar to those realized by the participants from the first two initiatives. At times, the benefits realized depended on the stage of the implementation process. During the initial stages of implementation, as participants examined their existing management system and began to develop the EMS structure, the benefits fell in the areas of improved communication and/or eliminating redundancy in roles and responsibilities. As the EMS implementation progressed and the participants began achieving their objectives and targets they realized cost savings, increased operational efficiency, improved environmental management, and risk reduction. The benefits realized by the participants once again offer compelling evidence that EMSs are an invaluable tool for public entities and offer sound return on investment.

The following tables provide example benefits as reported by participants. Participants stressed, during the reporting of EMS benefits at the conclusion of the pilot, that many of the qualitative benefits realized within their respective organizations, in terms of organizational change, were equally important to those that can be more easily quantified.

Example Quantitative Benefits Realized

Benefit	Participant Example
Realized Cost Savings	<ul style="list-style-type: none"> ▪ Saving \$680,000/year through contract change to conserve natural gas ▪ \$131,250/year through relocation of brush site and recycling center – more efficient operations ▪ \$42,000 saved in reduced tipping fees and recycling rebates ▪ \$37,000 from sale of surplus fuel oil
Potential Cost Savings	<ul style="list-style-type: none"> ▪ 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. ▪ \$267,500/year through modernization of fleet
Improved Environmental Performance	<ul style="list-style-type: none"> ▪ Conserving 140 million cubic feet of natural gas/year and eliminated 1 ton/year NOx emissions and 7,200 metric tons/year of CO2 greenhouse gases by implementing a contract change to reduce operation of an auxiliary steam boiler ▪ Water savings of 800 acre-feet per year, which also preserves as

	<p>much as 2,200 MWh of power generation through repairing hydroelectric tunnel leaks</p> <ul style="list-style-type: none"> ▪ Removed 80,000 gallons of surplus fuel oil ▪ Potential reduced air pollution by 5 million pounds of CO2 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 ▪ 85% reduction in Sanitary Sewer Overflows ▪ 3,100 tons recycled (50% of solid waste) in one year, including 260 tons of cardboard ▪ 157,000 cubic yards of landfill space preserved in one year through solid waste recycling initiative ▪ 58% reduction in CO2/year (5,000 lbs) and 88% reduction in NOx/year (42.4 lbs) from green steam cleaner
Environmental Efficiencies	<ul style="list-style-type: none"> ▪ Installation of propane generator with 10 times less NOx emissions than existing gasoline – fuel storage reduction too. ▪ Potential for 5% better fuel economy (770 gallons/year, 350% longer service interval, and 43% longer vehicle life with premium lubricant ▪ Service shop now utilizes water-based paint washing, refillable spray bottles, re-refined oil, increased service intervals, and dry shop spill cleanup methods.

Example Qualitative Benefits Realized

Benefit	Participant Example
Risk Reduction	<ul style="list-style-type: none"> ▪ Removal of unnecessary fuels from site, reducing accidental spills and releases ▪ In fixing leaks to hydroelectric tunnels, discovered several structural issues that may not have been otherwise identified ▪ Improved chlorine delivery system with sound controls ensuring that operators follow the same process across all shifts
Awards and Recognition	<ul style="list-style-type: none"> ▪ Certified as a Pollution Prevention Model Shop ▪ National Association of Counties (NACo) 2004 Achievement Award, runner-up for 2004 Clean Water Act Pretreatment Program Award, and Facility of the Year by Environmental Protection magazine for its Fats, Oils, Greases program ▪ ISO 14001 Registration
Employee Succession	<ul style="list-style-type: none"> ▪ Effective employee succession program to contain knowledge, important with 20+ year operators
Improved Relationships with Regulators	<ul style="list-style-type: none"> ▪ The EMS has definitely changed the relationship. They now look at us as an organization they trust and will look to for cooperative efforts.

Keys to Successful EMS Implementation

The keys to success reported by the participants in this initiative mirror those reported by the participants in prior initiatives. This validates the importance of obtaining top management support, having dedicated resources, securing employee buy-in, and having a strong Core Team if EMS implementation is to be successful. The following were keys to success specifically highlighted by third initiative participants:

Keep it simple – The KISS Rule

Participants uniformly agreed that it is critical, especially during the initial EMS implementation cycle, to keep things simple. An EMS represents a new kind of thinking and a new management approach for everyone within an organization.

Not only are personnel simply trying to understand what exactly an EMS entails, they are also attempting to look at daily activities from a different viewpoint with regards to environmental management. Furthermore, since an EMS is about continual improvement, it does not have to be perfect the first time through. There will be ample time to make course corrections and enhance the system as it becomes institutionalized and an organization continues to learn and evolve. As one participant put it, “we started off thinking we needed to create an impenetrable system and quickly learned to keep it simple. Start by identifying key items to tackle/address in the form of bullets, and expand from there as you learn what really needs to be accomplished”.

“Originally we struggled with implementing the EMS department-wide or within a smaller fenceline. We proceeded to select a fenceline that encompassed only about 10% of our operations and realized that we would not have been successful with a department-wide approach. We plan to expand department-wide, but will do so in phases to ensure a quality management system”.

- Charley Masco, Deputy Operations Manager, Clark County, WA

In the spirit of the KISS rule, most participants discovered that they need not make system procedures and related documents overly complex and detailed. Rather, one should consider an organization’s personnel and develop processes that fit within that unique system. An EMS is about efficiency, not complexity. As personnel become accustomed to this new way to doing business, an EMS can expand and evolve more naturally from that point on. EMS activities and responsibilities that are confusing or cumbersome will simply create frustration and potentially derail the overall process, as well as the pace of awareness and acceptance throughout the organization.

EMS is a continual program, not a project

Many organizations are accustomed to working project to project. Although an EMS initially appears similar to any other project (i.e., implementation steps, 18-24 month implementation, etc...) it is very important that personnel understand the difference. An EMS is much more than a project and if implemented properly becomes the management system by which everyday activities are conducted – the umbrella by which projects, programs, and initiatives get managed.

EMS should be built into the Business Planning Process

Since an EMS requires a resource commitment and is only as effective performance-wise as an organization desires or allows, it is critical that activities and processes are aligned with the business planning process. The ISO Standard specifically states that organizations should assess

their resource capabilities in setting objectives and targets. What are the limitations? What is possible this year? Next year? On a five-year horizon? Nothing dampens the enthusiasm generated by an EMS as much as the “plug being pulled” after activities and goals are established and planned for. Incorporate EMS activities in conjunction with the business planning process to ensure that plans can be implemented. An EMS needs to become automatic – the way an organization does business.

Management visibility, commitment and sustained involvement are critical to the success of the program

Visible, active, and committed management support and involvement is paramount to any successful effort within an organization. Personnel respond to management involvement and encouragement, plain and simple. Several organizations devoted upfront efforts to ensuring this by communicating often to top management, from the basics of what an EMS is and what it requires, to the hopes and aspirations of the Core Team, as well as progress of implementation activities. Some participants even created Steering Committees of mid to upper management representatives as a means to establish continued and active involvement throughout the process.

“Supervisors within the fenceline have already reported operational changes initiated by the staff as a result of our EMS development and that folks have been spending more time in work areas discussing environmental issues. EMS development has encouraged employees to tour and interact with other departments, which they would not normally cross into”.

- Kristel Riddervold, EMR, Charlottesville, VA

In many cases this included top management and/or line managers as active team members with clear EMS responsibilities defined. An EMS is a management system that involves everyone from top-down and bottom-up. For additional management insight, see Appendix C: Management Roundtable Summary.

You can’t implement an EMS without shop floor buy-in and involvement

An EMS is fundamentally about assessing an organization’s day to day activities and operations, identifying areas for increased efficiency and operational control, and implementing relevant changes. Adjustments of this nature can only take place on the ground, by individuals with the responsibility to conduct those activities. Not only are these the individuals that will implement required changes, but in most cases they are the ones that are on the frontline able to identify opportunities and communicate recommendations to the EMS team. Therefore, the buy-in and involvement of shop floor personnel is critical to the success and effectiveness of any organization’s EMS.

Internal and external communication is ongoing with an EMS

A management system requires frequent and ongoing communication inside and outside the organization. This is not only important during the initial stages of implementation, as organizations work to build common awareness, but also as the range of activities and efforts continue to expand as the EMS becomes institutionalized. Personnel at all levels need to work independently based upon their responsibilities, but collectively to ensure that all activities are conducted under the procedures and processes that

“During the first phase of EMS implementation, several areas for improvement were identified. The shop employees were open to new approaches and the management is embracing the recommended changes”.

- Pete Dubois, EMR, Clark County, WA

have been established. Communication needs to be up, down, and lateral. For many organizations, establishing and enhancing communication is a key driver for why they chose to implement an EMS. Establishing sound communication vehicles is often the best way to achieve buy-in from various levels and discover inefficiencies and redundancies, as well as new performance improvement opportunities.

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, Kent County, DE

Among the many successful approaches for communicating an organization’s EMS, participants learned that it is important to: have a plan and give the EMS an identity within your organization; describe the EMS in terms that are familiar

within your organization – don’t get too far into the jargon initially; promote EMS as a positive, learning opportunity for the organization; initiate peer-to-peer conversations; focus on the EMS benefits that resonate within your specific organization; and effectively communicate - reach as many people as possible to gauge interest and viewpoints. A prime example of effective communication is Metro Waste

Authority’s IMPACT

commitment to environmental management, which is useful both internally and externally for raising awareness.



Improving what we do everyday
Managing our impact on the environment
Preventing pollution
Adhering to rules and regulations
Communicating performance
Training our employees effectively

Outside technical guidance and resource support – don’t reinvent the wheel

The three EMS initiatives, along with various related public entity EMS practitioners and programs, have resulted in a wealth of EMS tools, mentors, and documented experiences to learn from. Participants throughout the third initiative embraced, in the spirit of the KISS rule, their access to external resources adapting previously successful approaches and modifying practitioner materials to meet their unique needs. In all cases, this resulted in greater efficiency and effectiveness in EMS implementation. Specifically, participants highlighted the value of participating in an organized program (i.e., access to the collective knowledge and expertise of the U.S. EPA, GETF, and the PEER Local Resource Centers), leveraging trade association interest and support, and basing their EMS on the internationally recognized ISO 14001 Standard. Participants expressed that these resources provided a formal structure and common language for EMS implementation, significantly reducing the learning curve and increasing the overall efficiency of implementation.

EMS Implementation Status of Participants in this Initiative

While participating organizations were at various stages of EMS maturation at the close of the two year process, all but one had fully operational EMSs at end of the program. The one organization completed all elements and a “readiness” audit to identify existing gaps within their EMS, but at the close of the program had yet to complete a full internal audit. Due to the size and structure of the organization, they felt that the EMS was progressing well, but had yet to be fully institutionalized within the organization.

Multiple factors can impact an organization's ability to successfully implement an EMS. Length of time, available resources, top management commitment, and employee buy-in all play a roll in whether or not the EMS will be fully implemented. It was expected that all of the participants would fully implement an EMS within the project's two-year timeframe and be fully prepared to achieve ISO 14001 certification if desired.

ISO 14001 Registration Audit

Upon completion of the third initiative program, Oakland County had successfully completed their third-party ISO 14001 certification audit. Several other organizations are preparing to follow suit, with Kent County scheduled to conduct a consolidated third-party certification audit for ISO 14001, ISO 18001 (Safety and Health) and the National Biosolids Partnership.

Organizational Resources Committed

The following section provides the average resource commitments, for an individual participant, toward EMS implementation over the two-year project period. The participants tracked the amount of time and resources they dedicated toward implementing the EMS throughout each of the four phases of the project. Each participant submitted a quarterly report detailing information on the following:

1. *Time Committed*: personnel involved by title and their respective hours
 - a. Top Management
 - b. Environmental Management Representative(s) (EMR)
 - c. Core Implementation Team
 - d. Specific Expertise Personnel: Legal, Human Resources, Maintenance, Interns, and Consultants
2. *Costs*:
 - a. Total Labor (internal): determined by the hourly rate of all employees involved in developing and implementing the EMS
 - b. Consultant Fees
 - c. Travel
 - d. In-kind Contributions from Outside Organizations
 - e. Materials: promotional materials, software, etc...

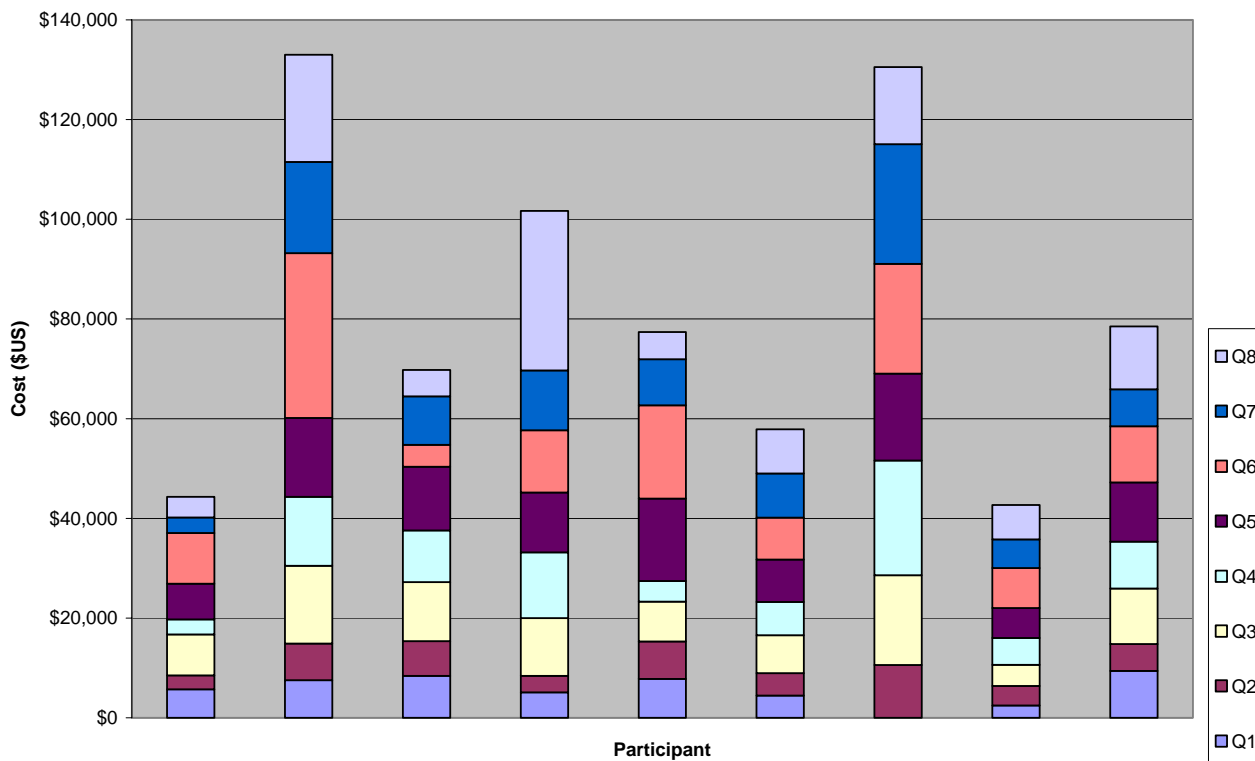
The bulk of the financial resources that participants invested involved direct labor costs. On average, each of the participants committed **2,110 direct labor hours**, which translated to **\$81,756 in average internal costs** over the two-year period. The values for direct labor hours committed ranged from a low of 1,235 to a high of 2,933 over the two-year period, with a range for total internal costs from \$42,678 to \$133,020.

	Hours Committed (two-year period)	Total Cost (two-year period)
Average per Participant	2,110 hours	\$81,756
Range		
Low Values	1,235 hours	\$42,678
High Values	2,933 hours	\$133,020

The amount of resources committed by each participant varied due to several factors, including size of the defined fenceline, nature of the specific process within the fenceline, existing management infrastructure, and the efficiency with which the EMS was implemented.

The following graph shows the average resource commitment throughout the 8 quarters of EMS implementation activities over the two year period for each individual participant organization.

EMS Implementation Costs by Quarter



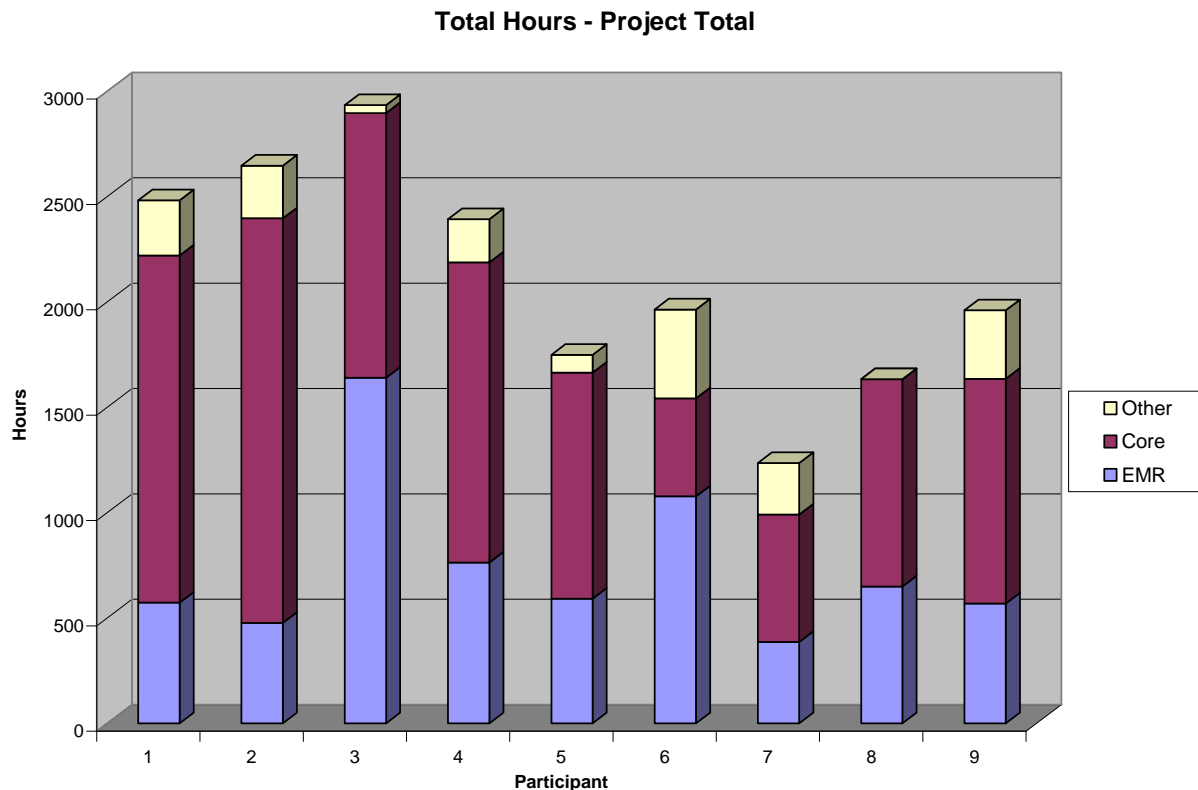
The majority of the direct labor hours committed by an individual organization, during EMS implementation, are the responsibility of the Environmental Management Representative (s) (EMR) and the Core Team. Each organization had different ratios of EMR hours to hours provided by Core Team members, with some organizations relying heavily on their EMR and others on their Core Team. In general, the work was split almost evenly between the positions with more work being delegated toward the Core Team, which commonly results in the EMS being more institutionalized throughout the organization as implementation activities and associated responsibilities are delegated.

The following table presents the breakdown of hours committed in relation to position responsibility. The averages are based on an overall average commitment of 2,110 direct labor hours per organization over a two-year period.

Position	Total Average Hours Committed (two-year period)
Environmental Management Representative(s)	747 direct labor hours
Core Team	1160 direct labor hours
Other: various assistance outside of EMS fenceline	203 direct labor hours
TOTAL AVERAGE	2,110 total direct labor hours

In addition to the EMS Management Representative(s) and the Core Implementation Team, city government personnel, community activists, administrative support staff, legal departments, and environmental managers contributed time to the EMS program (classified as “others” above).

The following graph shows the distribution of hours by individual participants over the two-year period.



The resource commitments of each participant are further examined in the individual case studies found in later sections of this report.

Use of Additional Consultant Services

Participants committed, due to the cost share structure of the program, \$30,000 over the two-year period for participation in the national EMS initiative. This cost share commitment covered GETF's technical assistance, workshop coordination and training, and program facilitation. Only one of the nine participants utilized the services of a consultant, in addition to the technical assistance provided as part of the national project, to address specific needs in their EMS implementation. The services provided by that consultant were due to extraneous operating conditions encountered by a participant during the two-year period. However, the outside assistance was minimal at a total cost of \$2,613. This reliance by participants of outside assistance was markedly less than the previous EMS initiatives, due in large part to employing the tools and lessons learned from the pool of EMS practitioners now available to public sector organizations. The following table provides total resource commitments from participants in the three EMS Initiatives for outside consulting services.

Initiative	Total Consultant Costs
Third Initiative Total	\$2,613
Second Initiative Total	\$73,069
First Initiative Total	\$165,600

The use of outside consultants depends upon the capacity of each individual organization; however, it is not, in most cases, necessary to rely on consultants to develop an effective EMS.

Resource Comparison to Prior Initiatives

In comparison to prior initiatives, this initiative was able to build off the experiences of the previous two initiatives and save on implementation costs and resources. The average costs associated with the third initiative were 1,103 direct labor hours and \$12,904 less than the average of the previous two initiatives. Furthermore, participants relied almost exclusively on internal labor resources during the third initiative, likely resulting in greater institutional capacity.

Initiative	Average Direct Labor Hours	Average Direct Labor Costs	Average Consultant Costs	Average Total Cost
Third Initiative Average	2,110	\$81,756	(\$30,000)*	\$111,756
First and Second Initiative Average	3,232	\$97,062	\$28,007	\$125,069

*As noted previously, each participant cost-shared \$30,000 over the two-year period to cover program support and technical assistance.

Return on Investment

While the decision to develop and implement an EMS entails a commitment of time and monetary resources, EMS implementation within a diverse group of local government organizations has shown consistent short-term and long-term returns on investment that often substantially outweigh the costs of implementation. In addition to economic savings, public

organizations have also realized a wide-range of other significant benefits, including improved relationships with regulators and external stakeholders, sound risk management practices which can often help avoid costly mistakes, increased use of pollution prevention, improved operational efficiency and control, and better public perception and image.

The following examples involving three organizations in the program are representative of the positive return on investment from EMS implementation. Additional information and more examples can be found in the case studies that follow highlighting the experiences of each participant in the program.

Sacramento Municipal Utility District

The Sacramento Municipal Utility District is currently the nation's sixth largest community-owned electric utility in terms of customers served, serving about 1.2 million residents in its 900 square mile service area. SMUD's EMS fenceline includes discrete operations within the Power Generation Department of the Energy Supply Business Unit. The Energy Supply Business Unit currently has 392 employees and is responsible for providing reliable electrical energy and ancillary service products to its retail and wholesale customers. Over the two-year project period, SMUD committed \$133,020 in direct labor costs encompassing 1,964 hours of labor time. Travel and other costs associated with the implementation totaled an additional \$20,499. However, over the two-year EMS implementation, SMUD has already experienced the following returns on investment:

- Completed repair of a hydroelectric tunnel leak with preliminary estimates of water savings of approximately 800 acre-feet per year, which represents 1,000 to 2,200 MWh of generation valued at \$50,000 to \$110,000;
- Conserving approximately 140 million cubic feet of natural gas per year with a value of \$680,000 per year, by implementing a contract change to reduce operation of an auxiliary steam boiler. This also reduces future air emissions by approximately one ton per year of NOx plus VOC (i.e., ozone precursors) and 7,200 metric tons per year of CO₂ greenhouse gases;
- Completed removal of 80,000 gallons of surplus fuel oil from a thermal generation plant, receiving about \$37,000 for its value, and reducing ongoing risks of accidental spills and releases;
- Proceeding with installation of a new diesel emergency standby generator with NOx emissions three times lower than the existing diesel generator; and
- Proceeding with installation of a new propane emergency standby generator with NOx emissions nearly ten times lower than the existing gasoline generator. Gasoline fuel storage at this site will also be eliminated.

Orange County Convention Center

The Orange County Convention Center in Orlando, FL defined the Building Services and Waste Management Division as their EMS “fenceline”. The Division committed \$44,351 in direct labor costs and 1,749 in direct labor hours over the two year EMS implementation period. Within the two-year implementation period, the Convention Center has already achieved significant returns on investment, including:

- 3,100 tons recycled of solid waste recycled in one year – 50% of the 6,200 total tons produced;
- More than 53,000 trees saved through recycling;
- More than 260 tons of cardboard recycled;
- More than 157,000 cubic yards of landfill space preserved; and
- \$31,000 in tipping fees saved, plus \$11,000 in recycle rebates.

Kent County Department of Public Works

The Kent County Department of Public Works in Dover, DE defined the Wastewater Treatment Facilities as their EMS “fenceline”. The fenceline includes a 16 MGD wastewater treatment facility with private sector biosolids treatment and land application of a Class A biosolids, 59 pump and lift stations and over 45 miles of force main and main sewer lines, and 39 staff with an additional 14 engineering staff with some responsibilities related to wastewater operations. The Department committed \$101,691 in direct labor costs and 2,933 in direct labor hours over the two year EMS implementation period. Within the two-year implementation period, Kent County has already achieved significant returns on investment, including:

- 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 especially with a majority of 20+ year operators approaching retirement;
- Potential reduced air pollution by 5 million pounds of CO₂ 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 whereby personnel on all shifts follow a consistent process;
- 85% reduction in Sanitary Sewer Overflows; and

- 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

Participant Profiles

The following profiles were developed by individual participant organizations, at the conclusion of this initiative, to highlight their respective EMS implementation experiences.



City of Charlottesville, Virginia Profile



The City of Charlottesville is located in Central Virginia, approximately 100 miles southwest of Washington, D.C. and 70 miles northwest of Richmond, Virginia. Situated within the upper Piedmont Plateau, at the foothills of the Blue Ridge Mountains and at the headwaters of the Rivanna River, Charlottesville was established as a town in 1762 by the Virginia General Assembly, and was incorporated as an independent city in 1888. As a result of eight annexations, the most recent of which was effective in 1968, the City now encompasses a land area of 10.4 square miles.

As the seat of both the City and County governments, Charlottesville serves as the economic, cultural, and educational center of a multi-county region in Central Virginia. In 1981, the Bureau of the Census recognized the Charlottesville area as a Standard Metropolitan Statistical Area (SMSA). The SMSA includes the City of Charlottesville and the counties of Albemarle, Fluvanna, and Greene. The 1990 Census listed the population of the City as 40,512 and the Charlottesville SMSA population as 131,373.

Charlottesville voters, at large, elect a 5-member Council to serve as the City's legislative and governing body. The members serve 4-year terms and they elect one Councilor to serve as Mayor and one as Vice Mayor for two years. City Council appoints the City Manager, the Director of Finance, the City Assessor, the Clerk of the Council and members of major policy-making Boards and Commissions. Council makes policy in the areas of city planning and finances, human development, public safety and justice, public utilities, and transportation. It has specific powers to pass ordinances, levy taxes, collect revenues, adopt a budget, make appropriations, issue bonds, borrow money, and provide for the payment of public debts.

Charlottesville is also home to the nationally acclaimed University of Virginia, which was founded in 1819 by then-Charlottesville-resident Thomas Jefferson. Enrolling over 12,000 undergraduate, graduate, and professional students each year, the University of Virginia ensures cultural enrichment of the city by hosting many events.

Founded in 1913, today the Chamber of Commerce has over 1,200 member businesses and civic organizations. Chamber members employ more than 45,000 men and women in the Charlottesville region, representing an estimated total payroll of more than \$1.3 billion a year.



Fenceline Information

The designated fenceline for this initiative was the City of Charlottesville Department of Parks and Recreation. The Department was selected due to the range of activities it is involved with and the visibility of its operations to the citizens of Charlottesville. The Department also wanted to distinguish itself as a leader in the City of Charlottesville in terms of environmental protection and worker health and safety.

The Parks and Grounds Division of the City of Charlottesville's Parks and Recreation Department is responsible for maintaining the extensive park system, trails, school grounds, two cemeteries and various landscaped beds and trees throughout the City as well as the vehicles and equipment to conduct these activities. The Division operates with a staff of 33 full-time and up to 12 part-time or seasonal employees.

The Golf Division is responsible for a beautiful 18-hole municipal golf course, located on the eastern edge of the City, as well as a smaller nine-hole sand green course located at one of the City's centrally located parks. The Golf Division operates with a staff of 10 full-time and up to 19 seasonal employees.

The Recreation Division is a diversion and entertainment activity provider whose mission is to offer activities and programs to refresh the mind and body of its participants. Services provided by this division are varied and include six specific work teams including Management & Business Services, Aquatics and Youth Classes, Athletics, City Market and Special Youth Activities, Recreation Centers & Youth Programs, and Therapeutics and Adult Classes. The Department operates with a staff of 68 full-time and up to 351 part-time or seasonal employees.

Top management support for the development of an environmental management system (EMS) for the Department of Parks and Recreation includes the City Manager, the Director of the Department of Parks and Recreation, and the Managers of the Divisions of Parks and Grounds, Golf, and Recreation.

It is the City of Charlottesville's goal to implement an EMS throughout the Department of Parks and Recreation and eventually to implement it on a citywide basis. The City adopted an Environmental Sustainability Policy in February 2003 and, in accordance with that policy, is committed to providing the resources necessary to successfully implement an EMS and to become an example of successful environmental stewardship at the municipal level.

EMS Core Team

The EMS Core Team played a vital role in advancing the EMS development and implementation efforts. The Core Team underwent subtle variations in personnel as the EMS matured, and included employees from within the fenceline as well as employees from other Departments such as Neighborhood Development



Services, Public Works, and Fire. The major responsibilities of the Core Team included serving as the head EMS cheerleaders, helping the Environmental Management Representative gather, organize, disseminate, and evaluate information, setting EMS objectives and targets, delegating EMS tasks, managing change, and advising, coordinating, and facilitating the EMS.

Key Drivers for Adopting an EMS

In November of 2001 the City Manager, Public Works Director, and the City Attorney attended a workshop addressing environmental challenges facing local governments. At the workshop, the complexity of the environmental regulatory environment and a need for compliance assurance were stressed; regional examples of regulatory non-compliance were presented and opened the eyes of local officials. This, in concert with already existing aspirations of promoting environmental stewardship, convinced City officials of the need to formally manage the environmental aspects of its operations. An Environmental Administrator was hired in October of 2002, and the City adopted an Environmental Sustainability Policy in February of 2003 which mandated the development and implementation of an EMS. The City's acceptance into EPA's nation-wide Third EMS Initiative for Public Entities soon followed.

Key drivers and goals for adopting an EMS included:

- Credibility and accountability with both the community and regulators (EMS approach is promoted by both EPA and DEQ)
- Desire to be an innovator and leader in environmental stewardship
- Need to capture institutional knowledge to deal with turnover of staff
- Need to quickly adjust to changing operations
- Minimize environmental impacts and maximize improvements
- An ultimate goal of attaining sustainable operations

The City came to the realization that the best way for local government to minimize environmental liability is to identify areas of potential risk and then develop and implement proactive management practices and guidance to reduce risk. The City's EMS is a comprehensive Citywide initiative focused on integrating environmental considerations into how we, as a city, do business.

Significant Aspects and Impacts

An integral component of the EMS effort was a thorough examination of the fenceline's operations, which produced a comprehensive listing of activities performed and their associated environmental aspects and impacts. From this listing, those activities that can have significant impacts on the environment were determined, and these significant aspects and impacts formed the backbone of the environmental objectives and targets and management plans that have been developed in pursuit of continuous environmental improvement.

In the first round of identifying environmental aspects for the Department of Parks and Recreation, the activities, aspects and impacts that are listed below were

determined to be significant. Significance was determined by ranking each aspect against a set of significance criteria that included both environmental / sustainability and business related criteria.

Parks and Recreation Significant Aspects

ACTIVITY	ASPECT	IMPACT
P.M.-VEHICLE & EQUIPMENT WASHING	WASTEWATER GENERATION (SOAP, DEGREASERS, PRESSURE WATER-HOT)	SOIL AND WATER QUALITY DEGRADATION DEPLETION OF NATURAL RESOURCE
BULK FUEL STORAGE (TANKS)	SPILL, MAJOR	AIR, WATER, SOIL QUALITY DEGRADATION
BULK FUEL STORAGE (TANKS)	CHEMICAL REACTION	FIRE / EXPLOSION
PESTICIDE, HERBICIDE, AND INSECTICIDE APPLICATION	RUNOFF	SOIL AND WATER QUALITY DEGRADATION
CHEMICAL STORAGE	RELEASE / REACTION	AIR, WATER, SOIL QUALITY DEGRADATION
HAZARDOUS MATERIAL USE	RELEASE / REACTION	EXPLOSION / FIRE / VAPORS WORKER EXPOSURE
CHEMICAL TREATMENT	RELEASE / REACTION	AIR QUALITY DEGRADATION HUMAN EXPOSURE
HAZARDOUS WASTE GENERATION AND MANAGEMENT	RELEASE / REACTION	AIR, WATER, SOIL QUALITY DEGRADATION AND HUMAN EXPOSURE
VEGETATIVE DEBRIS MANAGEMENT	THERMAL REACTION	FIRE/EXPLOSION/FUMES
WATER CONSUMPTION	CONSUMPTION	REDUCTION OF NATURAL RESOURCES

Objectives and Targets and Management Plans

The City has committed to managing the significant activities/aspects/impacts listed in the table above according to ISO 14001 specifications, which address operational controls, emergency preparedness, roles and responsibilities, communication, training, monitoring and measuring, and the maintenance of records and documents. Certain activities that were similar in nature were “rolled up” and managed under a general subject group. For example, the Chemical Management Program included five different activities with two associated aspects, while the Bulk Fuel Storage Program had two associated aspects that

were deemed significant. Objectives and Targets were set for four out of the five projects, which are detailed below.

Vehicle and Equipment Washing

Objective: Minimize/prevent the adverse stormwater runoff impacts resulting from vehicle and equipment washing.

Targets:

Short Term - to be completed by August 2004

- Investigate operational alternatives to minimize stormwater contamination by wastewater generated from washing activities.
- Evaluate and adapt current system to minimize stormwater contamination.

Long Term - to be established by October 2004

- Evaluate alternatives to current practices in order to propose a long-term solution (i.e., construction of a new facility).
- Research designs; identify funding sources (i.e., grants).
- Establish implementation timeline for long-term solution.

Bulk Fuel Storage (Tanks and Drums)

The activity of Bulk Fuel Storage was deemed to have two significant aspects, potential major spills and chemical reactions.

Objective: Reduce risk of spill or chemical reaction from bulk fuel storage and improve bulk fuel storage management.

Targets:

Short-Term - to be completed by June 2004

- Assess number, location, and condition of existing tanks.
- Relocate tanks from vulnerable locations, secure and combine contents of tanks where practicable.

Long-Term - to be completed by June 2005

- Develop and implement a Spill Prevention Control and Countermeasures Plan (SPCC Plan).
- Evaluate tank upgrade or replacement recommendations.

Chemical Management Program

Five significant activities/aspects that related to chemical use, hazardous materials and hazardous waste were wrapped up and consolidated into one City-wide program.

Objective: Develop and implement a City-wide Integrated Chemical Management Program.

Target: to be completed and implemented by June 2005

- The program will take a “cradle-to-grave” approach that incorporates procurement, storage, use and handling, and disposal.

Water Consumption

Objective: Establish a water consumption baseline and establish water conservation goals and strategies.

Target: to be completed by January 2005

- Develop data collection methodology; begin recording baseline data.
- Evaluate methodology and data collected in first six months to assess effectiveness.
- Compile water conservation opportunities for the Department to consider after baseline has been established.
- Finish recording and compile baseline data, evaluate conservation opportunities, and establish conservation goals (with timelines) as appropriate.

Vegetative Debris Management

Develop a management plan based on the following:

- Define categories of vegetative debris to be included in the management plan
- Assess current handling practices
- Document operating procedures
- Address emergency preparedness
- Ensure appropriate staff training

Benefits of Adopting an EMS

- Citywide Chemical Management Program being implemented
- Citywide Fuel Storage Tanks Management Program being developed
- Parks and Recreation water consumption baseline established...water conservation opportunities are clearer and will be measurable
- Significant changes in Vegetative Debris Management
- Clear guidelines & restrictions for Vehicle & Equipment Washing
- Enhanced compliance posture and accountability (resulting in cost avoidance)
- Enhanced internal communication, training, and documentation of institutional ("tribal") knowledge
- Improved recordkeeping
- Environmental awareness at a level not previously seen
- Current and future projects are being linked to EMS (e.g., electric golf carts, integrated pest management, demonstration rain gardens, stream buffer enhancement, chemical constituent review)
- Legitimized/justified expenses on improvement projects
- The EMS has served as a forum for raising other workplace and management issues. The effectiveness of the EMS as a *management* tool beyond an *environmental* tool has been seen. It has been a vehicle for dialogue.



- Employees “feel good” that management wants to improve their work environment and protect the natural environment
- EMS has provided visibility to the City’s environmental commitment
- Public recognition – Environmental Excellence designation from Virginia Department of Environmental Quality
- Tremendous citizen support

Resources

Over the two-year implementation period from January 2003 to December 2004, costs included \$30,000 for inclusion in the EPA program; a total of \$57,851 spent on 2,393 hours of employee labor; \$6795 in travel expenses, costs incurred in conjunction with hosting an EMS workshop, and EMS supplies. In addition, \$10,000 was spent for the purchase and implementation of Intalex’s ISOsoft environmental management software, a cost-share with the Rivanna Water and Sewer Authority.

Next Steps

The City of Charlottesville will continue to develop and implement its EMS throughout the City in a phased approach, fenceline by fenceline. The Parks and Recreation Department fenceline will be pursuing the Exemplary Environmental Enterprise (E3) designation from the Virginia Department of Environmental Quality’s Virginia Environmental Excellence Program (VEEP) in the summer of 2005. The fenceline has embarked upon its second cycle of EMS activity, conducting an annual review of activities, aspects, and impacts and establishing another round of objectives and targets and environmental improvement programs.

The EMS is currently being rolled out into the City’s Department of Public Works, Fleet Maintenance Division. The Fleet Division is responsible for operating, repairing, maintaining, and purchasing motor vehicles and equipment used to perform government services. In addition, the Fleet Division has operational control over a vehicle repair shop, two major fueling stations (including a CNG station), underground and aboveground storage tanks, and a vehicle wash rack.

Through the two year Third EMS Initiative for Public Entities the City has found its Environmental Management System to be an effective tool for maintaining environmental compliance, promoting pollution prevention, continually improving its environmental performance, and striving towards the ultimate goal of sustainable operations.

Charlottesville
Parks and Grounds



Third EMS Initiative for Public Entities - Final Report August 2005
Our City is a Park



EMS Case Study

Clark County Public Works

2003-2004

Organizational Profile

Clark County is located on 626 square miles in the Columbia River Gorge in SW Washington. North America's largest source of hydroelectric power, the Columbia River provides over 41 miles of river frontage in the county. Clark County mixes cutting edge industry and modern architecture with a rich and notable history. The county was named after the U.S. Army Officer, Captain William Clark, co-leader of the Lewis and Clark expedition that descended the Columbia River in November 1805. The area was organized into Clark County by the Oregon Territorial government in 1850 and now includes several cities and towns, including Vancouver, Washington's 4th largest city. Many Clark County residents make daily commutes across the Columbia River to Portland, Oregon, for work and play. Clark County has a total population of approximately 385,000 and is the fastest growing county in the 10th fastest growing state in the US.

EMS Fenceline

Clark County Public Works chose its Equipment Services section as its first EMS fenceline. Equipment Services is responsible for the management and maintenance of the county's fleet of vehicles and equipment. This section purchases new equipment as directed by departments and provides equipment and vehicle repair to numerous other public agencies, including fire districts, emergency medical services, school districts, municipalities, and utilities. Equipment Services also manages the following five inventory stores: equipment parts, road crew supplies, road oil, road rock, and traffic signs.

After completely implementing an EMS in Equipment Services, the goal is to expand the EMS throughout the Public Works Department and eventually to take it county-wide.

Key Drivers for Developing an EMS

Clark County Public Works has a long-standing principle of protecting and enhancing the natural environment. We also have an ongoing Continuous Improvement Program to enhance the work environment and provide greater value to the citizens of Clark County. A successful EMS program, first in Equipment Services, then in Public Works as a whole, will help us achieve our overarching goals. In addition, ISO 14001 certification will provide us with credibility in those endeavors.

Equipment Services was already an environmental leader in the community. Previous initiatives have included: Re-refined motor oil (1994); oil filter draining and crushing (1996), elimination of clean sweep (1997), refurbishing of police vehicles (1999); hybrid vehicle acquisitions (2001); B20 bio-diesel mix (2002); hosted bio-diesel conference (2002). In addition the section utilizes a closed-loop wash rack for cleaning vehicles and solvent-free parts cleaners.

Clark County Public Works decided to implement an EMS because the EMS structure was seen as an ideal framework to transition towards leaving a lighter ecological footprint and offered additional benefits:

- Improved employee participation in the facility's environmental performance;
- Improved overall environmental performance;
- Improved facility compliance with environmental regulations; and an opportunity to use employee creativity to move beyond regulations.
- Increased support from environmental professionals including EPA, WA Department of Ecology, and local regulators.

Organizational Approach

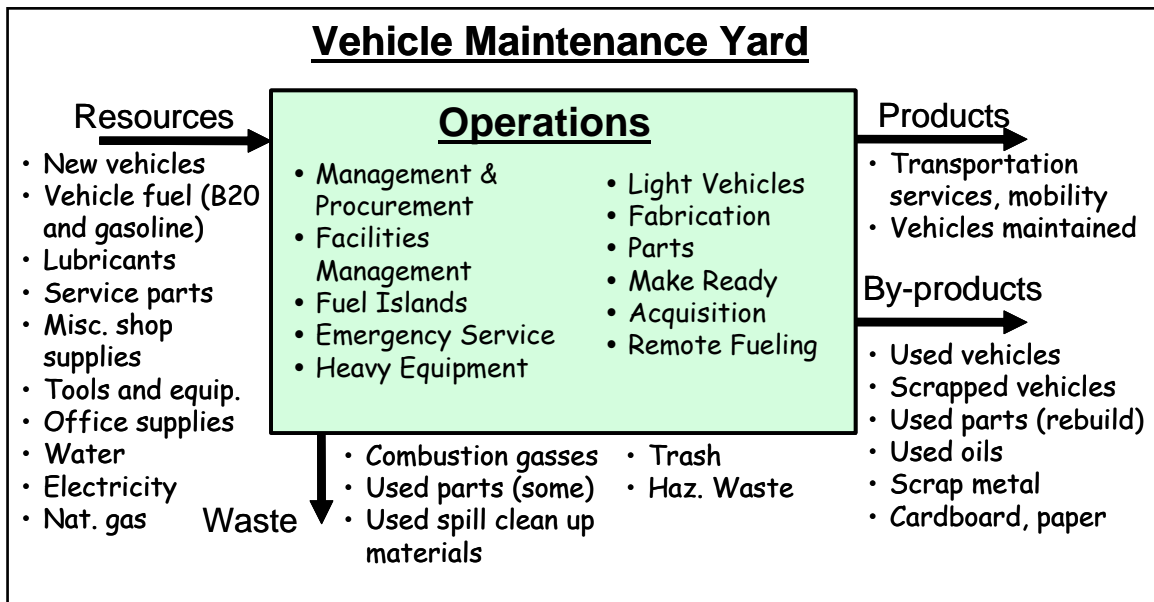
Clark County Public Works established a "Core Team" to oversee the EMS development and implementation. The Core Team consisted of the following members:

- | | |
|-----------------|--|
| • Pete Capell | <i>Public Works Director</i> |
| • Chris Carlson | <i>Heath & Safety Officer</i> |
| • Peter DuBois | <i>Environmental Management Representative</i> |
| • Bill Girard | <i>Shop Service Writer</i> |
| • Anita Largent | <i>Solid Waste Program Manager</i> |
| • Rick Lingo | <i>Shop Parts Acquisition</i> |
| • Charley Masco | <i>Deputy Operations Manager</i> |
| • Ed Pavone | <i>Risk Manager</i> |
| • Tim Scott | <i>Wastewater Treatment Plant Rep</i> |
| • Kelly Sills | <i>Commissioners Office</i> |

For the first 6 months of the EMS project the Core Team met twice a month to ensure a successful launch and sufficient management support. After the project was up and running the CT reduced their meeting frequency to once per month, and then to every other month. Managers and staff from other sections of Public Works attended some CT meetings to observe the progress so that they would be better prepared when the EMS implementation came to their departments.

Significant Environmental Aspects and Impacts

Clark County used diagrams to identify and analyze the inputs, outputs, and activities of Equipment Services. The activities were then transferred to a spreadsheet and their environmental aspects and impacts were identified and ranked in order to determine which are most significant.



Sample I/O Diagram

Dept/ Area/	Activity	Environmental Aspects	Env. Impacts						Sig.			
			Changes Air Quality	Changes Water Quality	Direct exposure to agent	Changes Habitat	Nuisance	Depletes Resource	Total Environmental Score	Regulated? (environment)	Regulated? (safety/health)	Significant?
Mainten- ance of Equipment	Scheduled and unschedule d in-shop services	Disposal of used parts and materials, consumption of new parts and materials, disposal of packaging from new parts, use and consumption of misc. lubricants and solvents, electricity consumption	3	0	1	0	1	3	8	Y	Y	Y

Dept/Area/ Operation	Activities	Environmental Aspects
Wash Rack	Operating the closed-Loop Wash Rack	Reduces water effluent
Wash Rack	Wash pad cleaning	Reduces chemicals used, absorbent pads, improves water quality
Remote Fueling	Overall Operations of remote fueling	Reduces miles traveled by fleet, reduces vehicle down time, reduces traffic & nuisance
Parts	Specifying and ordering parts and materials	Specifying recycled content, recycleability, toxic content, fuel used in transport, etc. of ordered parts & matls, consumption & disposal of waste paper/forms
Acquisition	Buying & renting small equipment, passenger vehicles and heavy equipment (demo, writing specifications, bid process, delivery)	Fuel type, fuel economy, air emissions, vehicle content and recycleability, misc other impacts depending on equip rented
Fabrication	Welding, scarfing, cutting	Smoke, consumption of gasses & welding wire/rod & misc materials, consumption of steel stock, electricity consumption, disposal of scrap metals
Shop Cleaning	Bathroom, floor and other cleaning	Toxicity and VOC content of cleaning solutions, recycled content and recycleability of materials, evaporation/drying of cleaner, consumption of water, flushing water with cleaner down drains, consumption & disposal of used cloths/rags, disposal of paper towels and other bathroom waste
Maintenance of Equipment	Scheduled and unscheduled in-shop services	Disposal of parts and materials, consumption of new parts and materials, use and consumption of misc. lubricants and solvents, electricity consumption
Facilities Maintenance	Routine scheduled maintenance	Consumption of small quantities of solvents & lubricants, disposal of waste parts & materials & packaging, consumption of parts, disposal of waste ballasts & bulbs (Hg?), consumption of ballast and bulbs
Maintenance of Equipment	Managing/specifying repair by outside shops (bodywork, muffler, windshield, transmission, etc.)	Disposal of parts, materials and packaging, consumption of new parts and materials, use and consumption of misc. lubricants and solvents, electricity consumption, fuel consumption for transport/towing, air emissions from transport/towing, nuisance from transport/towing
Fabrication	Spot painting	Air quality in shop, disposal of empty cans
Facilities Maintenance	Building heating, lighting and water	Consumption of water and power

Make Ready & Strip	Assembly/disassembly/work of vehicles	Disposal of scrap parts, consumption of a small amount of solvents and adhesives, consumption of new parts
Remote Fueling	Driving truck around, dispensing fuels	Wear & tear (tires/brakes), burns fuel, accidents, nuisance, fugitive air emissions
Wash rack	Maintenance and pumping out of oil water separators	Reduces oil contamination of storm water, disposal of sludge, electricity consumption?
Parts	Storing parts and materials (4505/4507) - no secondary containment for 55 gal. drum(s)	Potential leak or spill
Emergency Repair	Filling shop repair truck bulk tanks (oils)	Potential spill
Fuel Islands	Fueling & Self-servicing (washing windows, checking oil/tires/water)	Fugitive air emissions, potential spill, consumption and disposal of clean up materials, reduces and causes water/land contamination
Parts	Receiving and issuing parts and materials	Disposal of packaging materials, potential for leak/spill, obtaining MSDSs, consumption of fuel (propane?, electricity?) for forklifts for stocking parts, consumption and disposal of waste paper/forms
Facilities Maintenance	Remodel & repair (painting, floors, walls, windows, roof, etc.)	Air emissions, disposal of waste paint and solvents, potential for spill, consumption of paint & solvents & supplies, disposal of waste materials (masking supplies, etc.)
Remote Fueling	Remote servicing of vehicles	Disposal of used parts & filters, disposal of used motor oil
Fabrication	Machining	Electricity consumption, disposal of scrap & metal chips, consumption of small amount of water and cutting lubricant
Emergency Repair	Repair broken down heavy equipment, mowers	Disposal of used/broken parts & matls, consumption of new parts & matls, consumption and disposal of misc supplies, disposal of waste packaging materials
Emergency Repair	Field welding (Culverts & guard rail repair)	Smoke, consumption of welding materials and supplies, burning fuel for generator for arc welder, disposal of waste materials
Wash rack	Washing and pressure washing vehicles (water recirculated) & parts	Water consumption & evaporation, electricity consumption, consumption of any solvents?
Parts	Paying supplies (accounts payable - Oracle_	Consumption & disposal of waste paper/forms
Make Ready & Strip	Advising on part & vehicle specifications (see acquisition)	Fuel economy, emissions, vehicle toxics content

EMS Objectives, Targets, and Programs

Objective: Reduce Hazardous Air Emissions & Greenhouse Gas (GHG)

Target	Measured/Verified	Program(s)
40% reduction in overall air emissions from diesel equipment by 2008	<i>Fuel purchase records- 2003 baseline</i>	Biodiesel Program, Low Sulfur Diesel Program , Diesel Retrofits, Diesel Steam Cleaner, Idling,

Objective: Reduce municipal solid waste disposed

Target	Measured/Verified	Program
5% reduction in solid waste generation by 2004	<i>Antifreeze purchase records – 2003 baseline, Aerosol can weights</i>	Antifreeze Consolidation Program, Aerosol & (Non-car) Battery Recycling Program
100% removal of mercury switches from surplus and sold vehicles by 2004	<i>Recycling records, Purchase records</i>	Switch the Switch Program

Objective: Conserve Resources

Target	Measured/Verified	Program
10% reduction in motor oil and oil filter usage by 2006	<i>EMIS - 2003 baseline</i>	Engine Oil Drain Interval Program
10% improvement in average fuel economy by 2006	<i>Fuel purchase records, and vehicle maintenance records - 2003 Baseline</i>	Acquisition Program
10% reduction in energy use by 2006	<i>Energy Bills (KWh saved per year) - 2003 baseline</i>	Energy Conservation Program, Waste Oil Burner

Objective: Improve Indoor Air Quality

Target	Measured/Verified	Program
Reduce complaints from Scarfing, Welding by 2005	Annual Survey	IAQ Program

Benefits of Implementing an EMS

2004 Environmental Management System (EMS) Accomplishments:	
Shops	Work Instructions written to ensure that the shops operate efficiently and safely
Lon O./ John C.	\$10,000 per year in diesel fuel cost savings (switched from B20 - Ultra Low Sulfur Diesel)
Lon O./ John C.	\$6,000 one time savings (replaced diesel powered steam cleaner with a unit using 220v electricity to operate the cleaner and propane for

	heating the water. The system is more convenient to use, generates less noise and exhaust emissions.
Bill G. / John G.	Inspection log and protocol put in place to regularly check used oil bulk collection tanks
Bill G. / John G.	All barrels, containment tanks and secondary containers labeled
Bill G.	Mercury switches removed prior to sale or surplus
Bill G.	Oil drain interval extended for animal control vehicles
2003 Environmental Management System (EMS) Accomplishments:	
Rick L.	Brake Clean – Bulk purchases eliminates 1700 aerosol cans per year
Lon O. / Rick L.	Transmission Fluid Containers – Bulk purchases eliminates 1300 quart bottles per year
Earl M. / Rick L.	Antifreeze draining –
Chris F.	Drip tanks for distributor and paver
Charley	Biodiesel fuel filters – explored issue of filters plugging
Chris C.	Environmental recycling and disposal services – formalized selection process
Earl M.	Sludge burner – removed
John G.	Secondary containers – new labels applied
John G.	Reduced spill potential by improved oil filter crusher drainage system
Chris C.	MSDS – electronic system installed and made available to all shop employees
Chris C.	Scrap metal from oil and fuel filters recycled

Work instructions are now written to ensure that the shops operate efficiently and safely. Work instructions have been drafted for used oil recycling, antifreeze replacement and disposal, oil and diesel fuel filter recycling, mobile air conditioning charging and recycling, scrap metal recycling, tire collection and disposal, and mercury switch change-out.

Diesel Fuel Cost Savings - \$10,000 per year

Through the Environmental Management System process the shops assessed their impact on the environment and discussed options for improvement. During one of these meetings mechanics voiced concerns of the use of biodiesel in the County's 250 diesel vehicles and 70 additional contracted diesel vehicles. Mechanics raised concerns over clogged fuel filters (this is initially expected as biodiesel acts like a solvent and cleanses crud buildup in engines) put the problem seemed to persist. Management responded to the mechanics concerns and arranged to have fuel filters sent back to be analyzed. Management attended a conference on biodiesel fuels to better familiarize himself with the product. After considerable review and continued input from the mechanics, management helped move the county towards a new diesel fuel product – ultra low sulfur diesel. As a result of the switch Clark County continues to be a leader in adopting cleaner green fuel products, honored the input and concerns of the mechanics and saved money. Ultra Low Sulfur Diesel costs 10 cents per gallon

less than Biodiesel. A significant amount when you are pumping over 100,000 gallons of diesel fuel a year.

Hot Water High Pressure Washer - \$6,000 one time savings

An old diesel powered steam cleaner needed replacement. The cost to replace with a new diesel unit was estimated at \$10,000. During this time new pavement was being laid down outside the shops and a mechanic recommended they take the opportunity to run a natural gas line to the wash rack station to allow for a cleaner more environmental unit. After analysis showed that natural gas was not an option, The EMS group looked into other options and found out that a unit using 220 v. electricity to operate the system and propane for heating the water would cost \$3,500 less, burned cleaner, and was more convenient to use with significantly less noise and exhaust emissions. The environment management system created the mechanism to involve internal communications to come up with a solution that saved money, protected the environment and improved the workplace.

Internal audits - A recent audit of the Oil Collection work instruction found that there was not a formalized process for making sure the bulk collection tanks for used oil were checked. As a result the shops are now set up with an inspection log for the waste oil tanks. The designated shop safety person checks them weekly and writes in the log the findings. Another audit finding showed that labeling was incomplete. Arrangements have been made to set up the MSDS software to make labels. Now all barrels, containment tanks and secondary containers have been cleaned and labeled.

The team desk audited all controlled documents to date. We discovered numerous records missing from the Records Log, Reviewed and updated the draft EMS Manual, identified gaps in the structure and responsibility on-line information (job classifications), and created a checklist of EMS responsibilities.

Additional Work

The EMS team is looking into the possibility of extending oil change intervals to reduce engine oil and filter use, saving resources and man hours. The team has established baseline data from oil samples, selected pilot test vehicles, and implemented oil sample testing. The goal is to change oil drain intervals to achieve maximum savings and engine reliability.

Clark County has a customer service database linked into the County's GIS system. The database is used to track complaints that come in from the public and is used to assign the task to a responsible party who is then responsible for closing out the call. The EMS team has been able to utilize this database to track audit findings and corrective actions.

Public Works
Customer Service Detail Report
Showing Required and Open Calls
Assigned To: Girard, Bill



2 records

Call Information

Call Date: 10/21/2004

Call ID: 1221

Caller Name: PETER DUBOIS

Entered By:

Address:

City State Zip: , 99999

Phone: 4961

Call Location: N.& S. shops

Response

Assigned To: GIRARD, BILL

Extension:

Date Due: 02/10/2005

Completed On: N/A

Response Time: N/A

Callers Statement

Requirement: ISO 14001 4.4.6 reads: 'The organization shall plan [significant] activities by establishing and maintaining documented procedures...stipulating operating criteria' Finding: EMS Nonconformity - ER-WI-002 'Oil Collection' need to set up inspection log, assign staff, apply labels, investigate new equipment for oil collection

Conclusion

Corrective Action: Set up an inspection log for waste oil tanks. The designated shop safety person will check them weekly with the other checks and write in the log his findings. Place labels on tanks. Rick lingo is still waiting for prices from companies that make portable waste oil drain drums. The removable tops allow us to clean the sludge out, remove any objects that fell in and see how full it is so it doesn't over fill and create a spill.

Resources Needed

Personnel working on the development and implementation include the EMS Project Manager, two members of the EMS steering committee, the cross-agency core team (7 staff members) and occasional consultants. Top management is also involved with regular reviews. Although the EMS is not fully implemented based on total resources currently committed the total direct labor

time will equal approximately 2765 hours. Based on this estimate the labor costs and consultants for the two-year project will equal approximately \$103,968.

Estimated 780 hours – Actual hours – 885 (pay period 1-23, 2004) includes other agency demonstration outreach (Deconstruction, Battery/Foam collection, etc.)

Lessons Learned

The EMS project is alive and well, however the driving force behind a successful expansion will be dependent on management's willingness to participate in the program. During 2004 the health and safety officer left for another job opportunity and two shop managers retired. Having the EMS structure in place allowed for a smoother transition for the newly hired positions including Bill Girard as Shop supervisor who has been cross-trained. As Bill's supervisory responsibilities increase we will need to transition to another team member to take on some of Bill's duties.

Internal auditing is vitally important. We thought that we were about done with our EMS until we started auditing – then the real work began! As well-intentioned as everyone is, it is too easy for the activities needed to maintain the EMS to slip to the back burner. Auditing is what keeps an EMS alive.

Next Steps

Clark County is committed to using the EMS and expanding the EMS fenceline to other parts of the department over time. The EMS fenceline will next involve the Solid Waste Program and the Specialty Services Program.

Equipment Services management has embraced the program and as a result targets is taken seriously, progress reported, and outcomes communicated to the shop floor. Many worthy accomplishments have occurred so far and, hopefully the successes and momentum can be continued. Another critical consideration will be to make sure that the Core Team members specifically the Environmental Management Representative, Safety Coordinator and Internal Audit Team's are not spread out too thin as the fenceline expands.

Clark County expects to go for ISO 14001 registration in 2006.

EMS Profile – City of Kansas City, Missouri

Profile – The City of Kansas City is the largest municipality in the State of Missouri, both in population (approx. 450,000) and in area (322 square miles). The City Government has approximately 5,000 employees organized into 16 Departments. The City Government is led by an elected Mayor and City Council, and an appointed City Manager. The City government provides a full range of municipal services to the City's residents and businesses. Services provided by the City Government include water supply, wastewater treatment, road and bridge construction and maintenance, municipal waste collection, parks maintenance and operation, convention center operation and maintenance, airport operation, planning and zoning, business licensing and permitting, etc.

EMS Fenceline - In February 2000, the City of Kansas City implemented an EMS, applicable to all City Departments, which was not based on ISO 14001. Development and implementation of this EMS was spearheaded by the Department of Environmental Management. Beginning in 2003, the City developed and implemented an ISO 14001 based EMS for 2 divisions of the Department of Environmental Management: the Solid Waste Division and the Household Hazardous Waste Program.

The Solid Waste Division includes approximately 80 employees responsible for curbside collection of municipal waste, recycling, leaf and brush material, and bulky items and drop-off site operation for recycling, leaf and brush material, and waste tires.

The Household Hazardous Waste (HHW) Program utilizes 4 employees to operate a permanent HHW drop-off facility and to conduct approximately 25 mobile HHW collection events each year.

In 2004, the HHW program was transferred from the Department of Environmental Management to the Water Services Department. The implementation of ISO 14001 continued following the transfer. In 2005, the Solid Waste Division was transferred to the Public Works Department. The implementation of ISO 14001 continued following the transfer.

Core Team – The Core Team consisted of members of the Compliance Division, Solid Waste Division, and HHW Program of the Environmental Management Department. The individuals involved were:

Larry Falkin, Environmental Manager, Compliance Division

Michael Shaw, Division Director, Solid Waste Division

Bill Lewry, Program Manager, HHW Program

Andy Savastino, Scott Franke, Dwayne Walker, Ray Herzog, Environmental Officers, Compliance Division

Lara Isch, Environmental Officer, HHW Program

Francis Fleming, Equipment Manager, Solid Waste Division.

Goals – Kansas City identified 6 goals for its ISO 14001 EMS. These goals were intentionally broader than the ISO 14001 requirements, based on a decision to implement an “Integrated Management System” rather than just an Environmental Management System. Kansas City decided that it did not want 2 management systems – one for environmental goals and one for everything else. Kansas City decided to have one management system for all of its goals. The identified goals are:

Regulatory Compliance - meet or exceed the requirements of all applicable statutes and regulations

Employee Morale - provide a work environment which encourages and enables all employees to put forth their best efforts.

Sustainable Environment - conduct all activities in a manner that preserves and enhances the natural environment and serves as a model of sustainable practices

Public Involvement - include the public as an active partner in the Department’s efforts

Efficiency - use all resources as efficiently and sustainably as possible

Continuous Improvement - strive constantly to improve the Department’s level of performance

Teamwork – The Department will utilize a team approach to accomplishing the preceding 6 goals.

Aspects/Impacts – The evaluation of Aspects and Impacts in the Solid Waste Division led to the identification of 7 significant aspects. The identified significant aspects are:

- 1) Performing pre-trip inspections on all vehicles prior to operation.
- 2) Sorting and loading trash at illegal dump sites.
- 3) Purchase of replacement vehicles.
- 4) Maintenance/Upgrades of existing vehicles.
- 5) Providing training to existing and new employees
- 6) Maintaining the Division Safety Program.
- 7) Maintaining and communicating Policies and Procedures.

Objectives and Targets – The Solid Waste Division established 5 objectives and targets for the first year of its ISO 14001 EMS. These Os & Ts are:

- 1) Purchase the cleanest running, most efficient equipment available for our operations/Reduce emissions from heavy equipment by 10% each year for 4 years.
- 2) Utilize retrofits and maintenance procedures to reduce emissions and maximize efficiency from our existing vehicles/Reduce emissions from heavy equipment by 10% each year for 4 years.
- 3) Reduce accidents and injuries/Reduce accidents and injuries by 10% each year.
- 4) Reduce air quality impacts from Leaf and Brush Site operations/Move to a new site by 3/1/05.
- 5) Develop operating controls for illegal dump clean-up activities/Have operating controls in place by 6/1/04.

Benefits to Date – Kansas City anticipates deriving significant quantifiable environmental improvements and cost savings from implementing its EMS, particularly from projects implemented to achieve Objectives and Targets. Implementation has not yet proceeded to the point where quantification is possible.

Future Approach – Kansas City has recently implemented a major internal reorganization, including the elimination of the Department of Environmental Management and the creation of a new Office of Environmental Quality within the City Manager's Office. A decision has not yet been made regarding future leadership and staffing of the ISO 14001 EMS. Once those issues are resolved, the City will consider expanding the fenceline of its ISO 14001 EMS, and seeking 3rd party certification.



Kent County Department of Public Works Wastewater Treatment Facility Milford, Delaware

Organizational Profile

Kent County is 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, Parks and Recreation and Public Works. The County has over 250 employees within these three and the smaller departments. Included within the Public Works Department are the 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.

EMS Fenceline

The Dept. 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. The collection system consists of fifty-nine pump and lift stations and over forty-five miles of force main and main sewer lines. The wastewater treatment facility has been chosen as the fenceline for this EMS. It 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. A picture of the facility is provided below.



EMS Team

The EMS core team is made up of eight members with the Environmental Program Manager designated as the EMS Project Manager or “Environmental Management Representative”. Top management is actively involved in all core team activities, including participation in regular meetings via the Public Works Director.

EMS ORGANIZATIONAL STRUCTURE



Key Drivers for Developing an EMS

Kent County sought to implement an EMS because the county not only wanted to be a better environmental steward, but it also wanted to reduce its emissions, improve operational safety, and optimize both its resources and the quality of the Wastewater treatments systems byproducts.

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 14000 and 18000, and the NBP program

EMS Objectives, Targets, and Programs

Kent County identified 95 significant environmental aspects. Through this identification process the county identified the below Objectives, Targets, and programs to mitigate these aspects.

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. Replace 75% of Diesel Usage with Biodiesel in Operating Equipment. Replace Emergency Generator Diesel Fuel with Biodiesel. Get DNREC to Agree to Use Alternative Electricity Operation.

Target	Program(s)
	Replace Dryer Diesel Fuel with Bio-Fuel Made from Grease Trap Waste or Biodiesel

Objective: Reduce energy consumption

Target	Program
Reduce electricity usage by 20% from CY 2002 levels	<p>Enroll in EPA Green Lights Program.</p> <p>Get DNREC to Agree to use Alternative Electricity Operation.</p> <p>Upgrade to more Energy Efficient Pumps, Lights, etc.</p> <p>Seek Renewable Energy Alternatives such as Wind.</p>

Objective: Reduce or eliminate effects of chlorine and sulfur dioxide

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

Objective: Reducing sanitary sewer overflows (a.k.a. spills)

Target	Program
Reduce SSOs by 40% from CY 2002 levels	<p>Develop System to Document Sources of SSOs.</p> <p>Implement FOG Program.</p> <p>Develop Action Plans to Reduce or Eliminates SSOs.</p>

Target	Program
	Develop CMOM Program.

Benefits of Implementing an EMS

Energy Savings

Kent County has begun to look for ways to reduce its electric load. Their annual electric bill in the fenceline exceeds \$600,000. Due to this, the County is very seriously considering installing a renewable energy system using wind to replace the purchase of electricity generated by local power plants. Not only will this reduce the plant's electric costs by \$200,000-\$300,000, but potentially reduce air pollution by 5 million pounds of CO₂ per year, the equivalent of taking 500 cars off of the road.

Employee Succession

As a part of the EMS, operational controls must be developed. These controls establish the standard operating procedures for significant environmental aspects. The process has involved all employees within the plant. The EMS staff follow operations, and maintenance staff through their activities. They then record critical processes and photograph key equipment and functions. A procedure is written and then truth tested across all shifts. The result is buy in of all employees into the EMS, a transfer of "tribal" knowledge from long time staff to new employees, and ensuring that all shifts conduct the operations in the best manner possible.

Reduction in Air Pollution

Kent County has switched from Fuel Oil No. 2 to B20 biodiesel as a fuel source for its emergency generators. In addition, it is considering a switch to B20 for all of its diesel fleet. There is also a consideration of switching the primary fuel for its biosolids heating system. This is approximately 300,000 gallons per year. Compared to diesel fuel, B20 offers a 20% reduction in hydrocarbon emissions, a 12% reduction in carbon monoxide emissions, and a 12% reduction in particulate emissions.

Improvements in the Chlorine Delivery System

The EMS has established operational controls for the operation of the chlorination/dechlorination system operating at the plant. The controls ensure that chlorine and sulfur dioxide cylinders are changed out using the same process for all three shifts and that the procedure provides 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. 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 1000 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.

Resource Commitment

Actual time committed by all personnel at the plant to the development of the EMS is 2933 hours through 24 months of work. Beyond the EPA program Kent County did not use outside consultants, therefore their total labor costs beyond those associated with the program are estimated to be less than \$84,000. There was an additional expenditure to cover employee training, the use of an intern, and participation in EPA program of \$44,000. There is an expected \$35,000 expense to prepare for and conduct the certification audits under the ISO 14000, ISO 18000 and NBP programs.

Lessons Learned

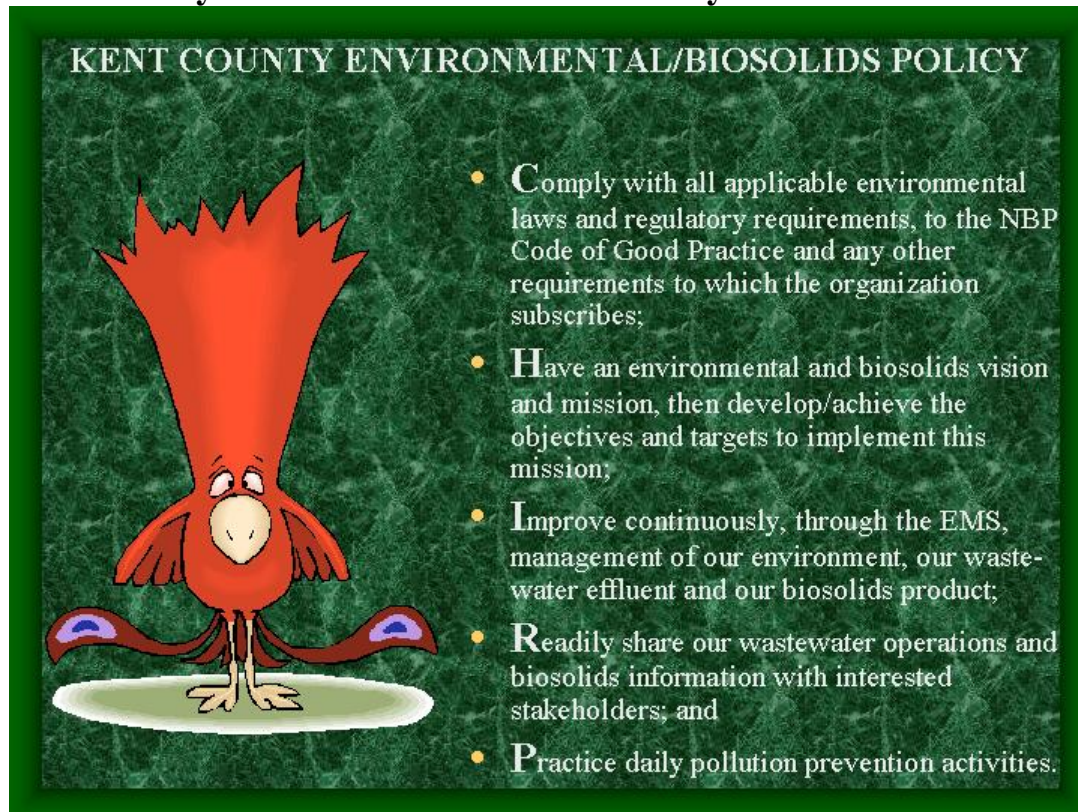
The only barrier Kent County found “was the need to establish momentum towards accomplishing the tasks. It’s like rolling a boulder down the hill. It takes quite a bit of effort to begin to make it roll, but it quickly gathers momentum as it rolls.” Kent County also found that communication is essential to all involved including outside contractors. Kent County included outside contractors on their Core Team.

Next Steps


Kent County will continue developing its EMS and advance its environmental targets. The County will seek third part 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 considering integrating safety and health measures to meet the ISO 18000 standards.

Kent County Environmental/Biosolids Policy:



KENT COUNTY ENVIRONMENTAL/BIOSOLIDS POLICY



- **C**omply with all applicable environmental laws and regulatory requirements, to the NBP Code of Good Practice and any other requirements to which the organization subscribes;
- **H**ave an environmental and biosolids vision and mission, then develop/achieve the objectives and targets to implement this mission;
- **I**mprove continuously, through the EMS, management of our environment, our wastewater effluent and our biosolids product;
- **R**eadily share our wastewater operations and biosolids information with interested stakeholders; and
- **P**actice daily pollution prevention activities.

Profile

Metro Waste Authority (MWA) operates the largest public landfill and household hazardous waste collection facility in the State of Iowa. These two facilities are the backbone of its integrated solid waste management system. While the landfill provides services to communities in three counties with a population of 380,000, the Regional Collection Center service area covers 7,500 square miles and 22 counties.

Metro Waste Authority is located in the capital city of Des Moines and is an excellent example of long-time success with regional government. Managed by an executive director and governed by elected officials from 17 member communities, the agency has operated Central Iowa's official landfill for 36 years. As the agency responsible for ensuring the area meets state waste diversion goals, it offers residents and businesses opportunities to improve their communities through recycling and other programs.

With a budget of \$18.7 million for fiscal year 2006, MWA is not supported by tax dollars; its entire operation relies on user fees generated primarily at the landfill.

MWA has received numerous awards; among them are the Gold Awards from the Solid Waste Association of North America for the Regional Collection Center for Special Waste Management in 1999, the Landfill Management Excellence Award in 2002 and the Transfer Station Excellence Award in 2004.



*MWA's Regional Collection Center (RCC)
for Household Hazardous Waste.*



MWA's Metro Park East (MPE) Landfill.

MWA provides a number of facilities and services to its member communities, both on its own and through numerous partnerships, including:

- Metro Park East Landfill
- Metro Transfer Station
- Metro Recycling Center
- Metro Compost Center
- Metro Methane Recovery Facility
- Regional Collection Center for Household Hazardous Waste

- Curb It!® Residential Curbside Recycling
- Compost It!® Residential Yard Waste Program
- Rehab the Lab School Chemical Management Program
- Clean Up Crew Mobile Hazardous Waste Collection Program
- School Education Programs
- Business Waste Minimization and Recycling Assistance

Fenceline

The fenceline for MWA's EMS is its Metro Park East Landfill and its Regional Collection Center for Household Hazardous Waste.

In the 2004 Fiscal Year, MPE handled over 510,967 tons of garbage and yard waste. Since opening in 1994, the RCC has diverted almost 2.4 million pounds of household hazardous waste from improper disposal.

Core Team

The Core Team played a vital role as the steering committee for the EMS implementation. It was important that members represented employees from both management and the front lines and that they possessed diverse skills and knowledge. Core Team members provided guidance and leadership, established EMS procedures, assigned roles and responsibilities, provided employee training, and communicated information about the EMS to stakeholders internally and externally. In the future, the Core Team will continue its role by assessing and evaluating MWA's environmental management system and targeting continuous improvement.



EMS Core and Implementation Team members listen to Jeff DuTeau from GETF. Clockwise from far left: Paul Nemmers, Mike Paine, Mike Fairchild, Roxanne Wilken, Beth Shonts, Jeff DuTeau, Jeff Dworek, Judi Mendenhall, and Larry Borchardt.

The Core Team is made up of seven members. They are Beth Shonts, Environmental Management Representative and business development manager; Jeff Dworek, director of operations; Judi Mendenhall, facility manager at the RCC; Mike Paine, compliance officer; Sarah Rasmussen, public affairs manager; Roxanne Wilken, administrative assistant II at the MPE Landfill; Paul Nemmers, solid waste utility worker at the landfill.

Goals of EMS Program

By establishing an EMS program, MWA continues to improve its comprehensive integrated approach to regulatory compliance, pollution prevention, maximizing resources, and improving staff commitment by involving all employees.

Throughout the process, MWA has aimed to:

- Become more efficient and cost-effective
- Establish MWA as forward thinking and environmentally sensitive
- Reduce liability and improve compliance
- Demonstrate MWA's commitment to the welfare of all 17 communities by better communicating its environmental ethic and economic goals.

MWA's Environmental Policy reflects these goals. The policy was condensed and made more memorable when agency employees adopted the IMPACT logo and statement:

Improving what we do everyday
Managing our impact on the environment
Preventing pollution
Adhering to rules and regulations
Communicating performance
Training our employees effectively



Significant Aspects and Impacts

The Core Team used a ranking system to determine which aspects had significant environmental impacts. The evaluation criteria included both environmental significance (scale, severity, probability, and duration of impact) and business significance (effect on public image, ease of change, health and safety impacts, cost, and concerns of interested parties). A threshold score determined significance. The significant aspects were targeted for improvement within three environmental programs: air emissions reduction, spill prevention and resource conservation. Each year the programs are also evaluated and refined to meet policy goals of continuing improvement.

Objectives and Targets for 2004-2005

Work teams were assembled to focus on each of the three environmental programs, which encompass MWA's objectives and targets. The work teams were comprised of individuals who have a good understanding about the day-to-day functions of the equipment and operations of the RCC and MPE landfill. The objectives and targets, as well as MWA's progress with them, are summarized below.

Objectives	Targets
Air Emissions Reduction	Reduction of Exhaust Emissions <ul style="list-style-type: none"> • Reduce NO_x, CO, CO₂, and SO₂ emissions, in pounds, by 5 percent from all motorized

EMS Profile, March 2005

	equipment and vehicles (excluding heavy equipment) by July 1, 2005.
Spill Prevention	Prevent Surface Water Pollution from Fuel Spills <ul style="list-style-type: none"> Implement Best Management Practices to reduce number of fuel spills by 75 percent by July 1, 2005
Resource Conservation	Reduce Consumption of Fossil Fuel Based Lubricants <ul style="list-style-type: none"> Reduce consumption of fossil fuel based lubricants by 5 percent by July 1, 2005

Air Emissions Reduction. MWA set a goal of limiting NO_x, CO, CO₂ and SO₂ emissions to 2.5 billion pounds annually—a reduction of 5 percent. Current measurements show that we have limited emissions to 1.3 billion pounds. We have already exceeded our goal by 44% with more improvements expected before the July 1, 2005 target date.

Spill Prevention. Because there was no history of reportable fuel spills, the work team put in place several measures to protect the environment from potential spills as well as to ensure that data is collected so as to establish a baseline to measure against in the future. All suggestions were generated by front-line employees, including:

- A cabinet was installed to catch drips and leaks from the fuel nozzle and to protect the nozzle from freezing.
- Fuel nozzles were upgraded.
- Spill kit materials were placed on trucks and equipment.
- Emergency contact signs were posted near the fuel storage tanks.
- Compactor fuel caps were sealed to prevent leaks.

Resource Conservation. Working with a representative from Mobile/Exxon and Boyer Petroleum, MWA employees switched all semi-tractors from mineral-based oil to synthetic oil. Other equipment will be phased in over time. By the end of the fiscal year (July 1, 2005), oil changes will have been reduced by 75 percent, resulting in an annual savings of over \$3,000 in consumables, labor and down time. In addition, in-service time for all equipment will be increased.

Benefits to Date

When Metro Waste Authority began the process of EMS implementation in 2003, there were a number of expectations by management, staff and MWA's executive director:

- Consistency in managing environmental impacts
- Driver for innovation and a new way of thinking
- Establish an "environmental" culture
- Continual improvement in what we do and the way we do it

- Integrate processes and standards into a single system instead of having a series of consecutive management initiatives
- Better communication throughout the organization
- Improve handling of documents and records
- Demonstrate MWA's commitment to going above and beyond regulatory requirements

These expectations have been realized and are some of the important qualitative benefits experienced by MWA.



RCC employees sorting and packing hazardous materials.



MWA employee directing traffic at the landfill.

Approach to the Future

While MWA's employees, including management, believe that the qualitative benefits in themselves have justified the implementation of an environmental management system and have proven to be a real value, MWA's approach for the future is to quantify benefits focusing on the following parameters:

- Staff time and support costs
- Cost savings/avoidances compared to costs
- Cost savings/impacts of environmental management programs

In deciding to move to the next level, MWA plans to perform a business case evaluation for EMS certification, determining whether self declaration or third party certification makes the most sense for the agency.

Resources

Throughout the program, MWA has seen support from all levels of employees at each of the participating facilities. The Environmental Management Representative, Beth Shonts, is responsible for the development and implementation of the EMS at MWA. Helping Shonts are six Core Team members who have also worked extensively to make the program a success. The labor time devoted to MWA's EMS implementation was 2,482 hours and cost approximately \$69,761.

Management Commitment

The solid waste industry is continually evolving. Many of MWA's communities and residents think that disposal should be low cost—or free—not realizing the negative impact this attitude can have upon sustainable programs. By enhancing the solid waste industry's credibility through an EMS, MWA will have furthered its efforts to help people think in terms of managing resources rather than managing solid waste.

MWA is known throughout the state of Iowa and the nation for taking a leadership role in its industry. The implementation of an EMS was the next logical step in the organization's evolution. It sets an excellent example for the state and the more than 400,000 citizens that MWA serves.

OAKLAND COUNTY DRAIN COMMISSIONER'S OFFICE

Profile

The Oakland County Drain Commissioner's Office is charged with the responsibility of meeting Storm water regulations as a subset of the 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 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



Construction continues at a \$144 million Retention Treatment Basin

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, right up 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 on 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 when it's needed. Some tasks, such as fixing a break in a water main, require immediate

attention. Oakland County residents expect a prompt response from our 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 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.

Fenceline

The two divisions under the Oakland County Drain Commissioner are Engineering & Construction and Operation & Maintenance. Both divisions have been included in our fenceline, which includes approximately 240 persons and 20 Units. The scope of our Environmental Management Program is as follows:

Project Management, Regulatory Review, Environmental Stewardship, Operations and Maintenance service for Storm Drains, Sewers, Water supply, and Wastewater Treatment managed at the following Oakland County Drain Commissioner sites: Commerce Wastewater Treatment Plant, George W. Kuhn Retention Treatment Basin, Pump Maintenance Facility, Walled Lake / Novi Wastewater Treatment Plant and Water Maintenance Facility with support from Administration in Waterford, Michigan.

Key Drivers for Adopting an EMS

Our primary goals are to improve employee awareness of environmental issues while building a positive working relationship with federal and state agencies. While we've prided ourselves in being environmentally sensitive, we're convinced that adopting an EMS and recently becoming certified to the ISO 14000 environmental management standard has helped us improve on our success in the environmental arena while, at the same time, making a positive impact on helping our customers.

In short, we are committed to providing quality water 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 we do that, we contribute to the high quality of life Oakland County residents have come to enjoy and expect. Our adopting of ISO principles, both in the ISO 9000 arena and the ISO 14001, provide the necessary measurement tools to ensure that we do what we say and can prove it through observable, verifiable methods.

Top Management Involvement and Commitment

Top management participates in Core Group meetings and, on those rare occasions when unable to attend, they are kept apprised of all significant information about the implementation of the EMS initiative. Top management has been instrumental in ensuring that the necessary cooperation from staff is continually available. That has remained unchanged since initiating this process. However, to show the extent of top management involvement, our countywide elected drain commissioner has spoken at length about the subject both in staff meetings, to the public and at formal seminars and workshops. He also penned a column about the value of EMS which was published in one of the local newspapers. That article was shared with the other Muni III participants through the VPO. It shows the unquestioned support of the most senior management, and, by extension, the rest of our top management team.

Objectives and Targets

The ISO Steering Committee is comprised of mid- and top-level management and has the responsibility of determining Environmental Objectives and Targets. The ISO Steering Committee carefully considers the following items in determining objectives and targets:

- Significant aspects
- Legal and other requirements indicated on the External Document Matrix
- Best available technology
- Business requirements
- Cost
- Interested parties
- Employee health and safety

Objectives and Targets are documented on a Control Plan which also details the tasks needed to achieve the objective. The objectives and targets are reviewed at least annually by the Steering Committee.

Significant Aspects

The ISO Steering Committee reviews information obtained through the initial aspect analysis to determine the threshold for significant aspects. The current Significant Aspects are:

- Sewer System Overflows
- Septage Unloading Facilities
- Maintaining & Installing Meters
- Soil Erosion



Additionally, this process is performed periodically as new processes are implemented or at the request of the ISO Coordinator or a member of senior management.

**Making Waves
For Clean Water**

Benefits of Adopting an EMS

We are facing challenging times. Our customers are facing increasing water and sewer rates. It is part of the requirements of the Office that changing federal mandates are continually met while constantly focusing on preserving and protecting water quality and the environment. It goes without saying that the hard-working, conscientious men and women who work at OCDC are up to the task of maintaining our high standards while striving toward a better environment.

Chief among the benefits we have experienced by adopting and embracing EMS procedures and mandates is the retention of so-called “institutional experience” which previously left with the retirement or transfer of a key, veteran employee. This institutional knowledge is captured and retained in the forms, procedures and work instructions of our management manual.

It is important to emphasize that ISO is a commitment. It's a commitment to excellence and a commitment to improved, verifiable and repeatable results. It tells our customers and our constituents that our commitment extends, first and foremost, to them. Not only do we improve our operational efficiency as a result, but our environmental improvement is a natural consequence of embracing the ISO 14001 commitment. Today, and far into the future, we can focus on two important areas: Continuous Improvement and Customer Satisfaction. We have achieved tremendous accomplishments and now have a remarkable opportunity to move forward on the important initiatives that we have planned for the future.



Orlando, Florida EMS PROFILE



The Convention Center Complex is a multi-purpose facility designed for conventions, trade shows, meetings and consumer events. The Convention Center complex is located in the International Drive tourist corridor. The current West complex consists of 118 acres. The Convention Center's West Building contains approximately 4 million square feet of enclosed building space, including 1.1 million square feet of exhibition space. The exhibit space is contiguous and can be subdivided into 18 different configurations with moveable partition walls. Halls are "clear span" areas with 30-40 foot high ceilings with support facilities consisting of approximately 353,000 square feet of meeting rooms which includes an auditorium seating 2,643 of performing arts quality, a 62,000 square foot ballroom, 2 fully equipped kitchens, concessions spaces, administrative spaces, dressing rooms, shops and storage areas. There are parking facilities for approximately 4,000 vehicles. There are 13 drive-up ramps into the exhibition halls, with 97 truck bays. There are many service providers and partners offering services such as catering, food and beverage services, telecommunications services, a business center, an audio-visual provider, a visual information system and internet technology service.

The North/South complex, a new expansion, opened in September 2003. This facility is located on a 115-acre site directly across from the West Building. The West and North/South building are connected by an open-air overhead walkway spanning the local roadway. The North/South Building added another 3 million square feet to our complex, with an additional 3,600 parking spaces.

The Convention Center has hosted many national and international meetings and trade shows such as the International Home Builders, American Dental Association, and Professional Golfers Association. Over 1.3 million attendees visited our facility in 2004. There are over 800 future events for which space in the Convention Center has been committed (as far out as the year 2028). In the first quarter of 2004, the Center broke records by hosting 75 events with approximately 500,000 attendees. In January 2005, the Center hosted 11 events with approximately 250,000 attendees.

The Convention Center is owned and operated by Orange County Government. A director appointed by the County Mayor manages the Convention Center and reports directly to an appointed County Administrator. The Convention Center and its staff constitute one of the eight departments of county government. There are 574 full-time employees and approximately 600 part-time employees.



Nine major divisions work under the direction of the Executive Director, the General Manager, and two Deputy General Managers of the Convention Center. These include (i) the Marketing Division, which is responsible for the sales and marketing of the Convention Center, including promotions and research; (ii) the Business Division, which is responsible for financial management, contract/lease administration, guest services and exhibitor services; (iii) the Event Services Division, which is responsible for event planning and coordination activities, and event setup; (iv) the Facility Operations Division, which is responsible for facility maintenance, heating, ventilation and air conditioning, and warehouse operations. (v) the Event Operations Division, which is responsible for event utilities, technical services, building services, (vi) the Information Services Division, which is responsible for providing telecommunications and data services; (vii) the Convention Center Human Resources Division, which is responsible for coordinating the recruitment, retention of staff and employee, labor relations and training; (viii) Security & Transportation Division, which is responsible for building security and life safety and on-site transportation management and community transportation and (ix) the Capital Planning Division, which is responsible for the capital improvements program and assisting in long range strategic planning.

For more information on the Convention Center see www.orlandoconvention.com

Fenceline

The fenceline for EMS establishment is solid waste, managed by Building Services section of the Convention Center. Future plans include expanding the EMS to the Facilities Maintenance section.

Core Team

The Core Team is comprised of three members from the Building Services Section, one employee from HVAC, one employee from Facilities Maintenance Section, and one member from Orange County Environmental Protection Division. The Environmental Management Representative rounds out the remainder of the EMS Core Team.

Key Drivers for Adopting an EMS

The Convention Center identified several critical factors that led to the decision to design and adopt an EMS within the Building Services section. Building Services is responsible for the disposal of over 6000 tons of trash and rubbish that is generated at the Orange County Convention Center. We recognized that great opportunities existed via a recycling program to reduce the amount of trash landfilled and also reduce our trash-hauling tipping fees. Other benefits and goals of the EMS implementation is to be the first Convention Center in the US to be ISO 14001 certified and to be the leading department in Orange County government for EMS implementation.

Significant Aspects & Impacts

After reviewing input/output evaluations within the building services section, many environmental impacts were identified. Using criteria likely to impact air, water, soil, resourced consumption, waste generation, costs, health& safety, each impact was ranked. The impacts were scored based on a high (3), medium (2), low (1) to determine what would be considered significant.

Objectives and Targets

The specific objective is to maximize recycling of vendor-generated waste, increasing the overall percentage of recycled wastes to 50%.

Benefits of Adopting an EMS

The Orange County Convention Center has realized the following benefits from the adoption of an EMS:

- Streamline communications concerning environmental practices
- Increase environmental awareness among employees
- Better defined roles and responsibilities
- \$30,000 in tipping fees saved due to recycling efforts
- 157,000 cubic yards of landfill space saved
- 3,100 tons of material diverted for remanufacture
- 50% recovery of all waste in 2004 compared to less than 1% in 2003
- \$11,000 in recycling rebates for 2004 compared to almost zero in 2003
- 260 tons of cardboard recycled

Resources

Personnel working on the development and implementation include the EMS environmental representative, three members of the Building Services section, one member from HVAC, one member from Facilities Maintenance section, and one member from Orange County Environmental Protection Division. Top management is also involved with periodic reviews. The total direct labor time is approximately 1723 hours. Based on the estimate, the labor costs and consultants for the two-year project is approximately \$61,517.

Next Steps

The Orange County Convention Center is committed to using the EMS and expanding the EMS fence line to other parts of the organization over time. The EMS fence line will next involve the Facilities Maintenance section. Currently, the selection of a registrar is the next step on the planning schedule towards ISO 14001 certification.

Management Commitment

The impact of the Environmental Management System is extraordinary, considering the relative infancy of the program.

-Tom Ackert, Executive Director, Orange County Convention Center





Rivanna Water and Sewer Authority Charlottesville, VA



Profile

The Rivanna Water and Sewer Authority (RWSA) is a public agency providing impoundment, treatment, storage and transmission of potable water and transport and treatment of wastewater for the citizens of the City of Charlottesville and Albemarle County. The RWSA is a wholesale agency with two customers: the City of Charlottesville Water and Sewer Division and the Albemarle County Service Authority. The Charlottesville Water and Sewer Division includes the University of Virginia as one of its primary customers. RWSA serves the City's 40,000 residents and about half of the County's 82,000 residents.

The RWSA operates the following water treatment plants: North Rivanna Water Plant, Observatory Water Plant, and South Rivanna Water Plant for Charlottesville's urban area; Crozet Water Plant for the town of Crozet; and Scottsville Water Plant for the town of Scottsville. The RWSA operates the following wastewater treatment plants: Camelot Wastewater Treatment Plant; Glenmore Wastewater Treatment Plant; Moores Creek Wastewater Treatment Plant; Scottsville Wastewater Treatment Plant; and Stone Robinson Wastewater Treatment Plant. In addition, the RWSA manages the Beaver Creek Reservoir (Crozet), Ragged Mountain Reservoir, South Rivanna Reservoir, Sugar Hollow Reservoir, and Totier Creek Reservoir (Scottsville).

Both Authorities are governed by a five-member Board of Directors consisting of City of Charlottesville and Albemarle County representatives, and a Chairperson selected jointly by the City Council and County Board of Supervisors.

Fenceline

The fenceline for EMS implementation is the Moores Creek Wastewater Treatment Plant, which includes the plant as well as administration, laboratory, maintenance, and compost operations. The Rivanna Pump Station was also included. Moores Creek treats on average 10 mgd of wastewater. It was chosen for its size, environmental impact, public interest, and importance within the Rivanna River watershed.

The wastewater is degrittied, clarified, purified, then put through a chlorination - dechlorination system before being discharged to Moores Creek, which leads to the Rivanna River, which then leads to the James River. After anaerobic digestion, the waste sludge is sent through a filter press, and the filter cake is mixed with wood chips and composted. The compost as well as used wood chips are sold at the Moores Creek facility for lawn and garden applications.

Core Team

The Core Team has played a vital leadership role in facilitating the EMS project, prioritizing tasks, establishing deadlines, collecting and evaluating work, and providing training, guidance and assistance where needed. The Rivanna Authority Core Team will continue to meet quarterly and consists of:

Anne Tate Bedarf, Environmental and Safety Manager
Patricia Defibaugh, Chemist
Mary Knowles, Executive Secretary
Cary Lang, Assistant Wastewater Operations Manager
Mike Ralston, Compost Operator
Norman Wescoat, Wastewater Operations Manager
Jennifer Whitaker, Chief Engineer
Robert Wichser, Director, Water and Wastewater Operations

Key Drivers for Adopting an EMS

In early 2002, the Rivanna Authorities created the position of Environmental and Safety Manager to provide more focus to these important areas; a key responsibility of this position was the creation of an Authority-wide EMS. The Executive Director and Board of Directors was convinced that EMS would be an appropriate tool for the RWSA to manage its operations more effectively and lessen impact on the environment. The opportunity to expand communication with external stakeholders and gain positive recognition from the highly involved community was another key driver. Staff felt that if a program were not implemented, the wealth of knowledge from long-time employees would be lost. The involvement of employees and resulting enhanced communication were key to successful EMS implementation, with the added benefit of increasing public confidence in RWSA operations.

Significant Aspects & Impacts

Considerable time was spent by the Core Team in the “plan” stage examining in detail Moores Creek operations, activities, inputs, outputs, environmental aspects (interaction with the environment, the “cause”), and environmental impacts (“effects”). Over 60 environmental aspects and concurrent impacts (some of them positive) were identified. The degree of significance for each impact was ranked according to the following criteria: severity, duration, release to the environment (air, water, soil, noise), impact on health and safety, and public perception. After the significance analysis was completed, the Core Team chose the top 7 environmental aspects as significant for the Moores Creek WWTP:

Significant Environmental Aspects for the Moores Creek WWTP

Activity	Aspect	Environmental Impact
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
Septage Receiving	Potential spills/Runoff/Release	Degradation of water quality
Industrial Discharge	Pretreatment Program	Degradation of water quality
Chemical handling (receiving)	Potential spills	Water, soil degradation
Wastewater Treatment/Effluent	Effluent wastewater discharge	Modification of water quality
Wastewater collection, transport, and pump (within Plant)	Possible bypasses and 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

In order to facilitate involvement from a diverse number of Moores Creek employees, an implementation team was formed for each significant aspect resulting in seven teams. All lead plant operators have been involved with these teams as well as relief operators, filter press operators, mechanics, engineering, laboratory and administrative personnel.

In addition, a team of four auditors were trained to perform in-house audits as well as audit team sharing with the City of Charlottesville.

Objectives and Targets

Objective 1: Reduce off-site odors coming from the Moores Creek Wastewater Treatment Plant.

Target 1-1: Examine odor reducing technologies for applicability to Moores Creek by December 2004 (complete).

Target 1-2: Incorporate odor study and control into Moores Creek Master Plan, which will be developed over the next two years (ongoing).

Target 1-3: Install carbon scrubbing system at the Rivanna Pump Station by December 2004 (complete).

NOTE: Number of odor complaints will continue to be tracked.

Objective 2: Reduce potential for pollution at the Septage Receiving Area.

Target 2-1: Obtain baseline for potential bacteria by sampling first flush stormwater runoff from the septage receiving area and compare to stream sample by April 2004. Continue to sample during stormwater sampling throughout 2004 (complete; quarterly stormwater sampling above and beyond permit requirements continues).

Target 2-2: Eliminate potential bacterial pollution from septage by January 2005 (paving project almost complete).

NOTE: This objective will contribute to odor control as well.

Objective 3: Improve water quality in the Rivanna Watershed through operational controls as well as working with partners in the watershed to reduce non-point pollution and sedimentation.

Target 3-1: Reduce sediment in Moores Creek stormwater by 10% by December 2005 (baseline data gathered in calendar year 2004, ongoing).

Target 3-2: Participate in and contribute to Moores Creek TMDL Implementation Team currently led by the Thomas Jefferson Planning District Commission. Continue partnership through implementation and monitoring until Moores Creek is no longer listed as impaired on the DEQ 303(d) list (ongoing).

Target 3-3: Assist stakeholders in achieving an “acceptable” benthic macroinvertebrate multimetric score (7 or above) for Moores Creek as sampled by the StreamWatch program by 2008 (the average score is 3 at the “Thach” site. Ongoing; staff assists with sampling and RWSA contributes \$7500 per year).

NOTE: This objective stems from effluent as a significant environmental aspect. Enhanced nutrient removal is in the early planning stages and will require major operational changes, direction from regulatory agencies, and significant capital improvement funds. Important collaborations contributing to these community-based targets include an ongoing Meadow Creek Interceptor Study, StreamWatch partnership, Moores Creek TMDL team involvement, and participation in the Rivanna Regional Stormwater Education Partnership. The RWSA has contributed \$12,500 to StreamWatch so far and has committed to annual funding of \$7500 to sustain the program.

Objective 4: Conserve natural resources.

Target 4-1: Increase use of sustainable (such as locally produced or using renewable resources), non-toxic, and recycled (“green”) products (ongoing).

Target 4-2: Reduce paper use by 10% (ongoing).

Target 4-3: Establish packaging material recycling program by August 2004 (complete).

Target 4-4: Establish an environmentally-preferable purchase, procurement, and contracting policy by December 2004 (in draft form).

Benefits of Adopting an EMS

Broad accomplishments include increased environmental and worker protection, better understanding of operations, and increased communication and trust. Rivanna has begun to offer an environmental suggestion incentive award, similar to safety suggestion awards. The benefits of these accomplishments, while not measurable in a traditional economic sense, are far-reaching and critical to efficient, productive operations with continual improvement.

Specific accomplishments for each team are summarized below. In some cases projects may have been proposed or even begun prior to EMS development; however, EMS has served as a useful framework for bringing these goals together as they relate to Rivanna's environmental impact and show the ability of an EMS to take advantage of existing practices, projects, and plans.

Accomplishments

Odors

Accomplishments:

- Installation of carbon filtration system at the Rivanna Pump Station.
- Changes to compost process to decrease odor.
- Evaluated odor control technology.
- Experimental cover in place in septage receiving area.
- Conducted two days of training to operators for odor control.
- Implemented operating checklist using the Water Environment Federation's recently updated Manual of Practice for controlling odors.

Future Goals:

- Incorporate odor study into future Wastewater Department Master Plan.
- Evaluate capital improvements as they occur for odor control incorporation.

Chemical Handling (Receiving)/Spills

Accomplishments:

- Developed SOPs for chemical receiving and spill response.
- Re-routed ferric chloride line over catch basin for spill protection.
- Trained wastewater and water staff on spill prevention and stormwater pollution prevention.
- Completing sodium bisulfite conversion from totes to in-place tanks, eliminating an environmental and health and safety hazard.
- Installed locks on fill ports and signs at all chemical loading areas.
- Removed potassium permanganate from outside, large quantity storage.
- Upgraded compost yard diesel tank to double-walled.
- Switched used oil and antifreeze vendors at a cost savings.
- Added oil filters and rags to used oil recycling program.
- Added spill kits to compost yard and pump stations.

- Installed anti-siphon valves on all pump station generators and replaced fuel line on day tank at MC Pump Station Generator.

Future Goals:

- Replace non-functional methane leak detectors at the digesters.

Effluent (expanded to include Watershed Management and Stormwater Management)

Accomplishments:

- Converted Operations and Maintenance Manual to electronic format.
- Initiated expanded stormwater monitoring program above and beyond permit requirements.
- Became primary StreamWatch contributor (site on Moores Creek included).
- Partner in the Rivanna Regional Stormwater Educational Partnership.
- Participant on TMDL for Moores Creek Implementation Team.

Future Goals:

- Continue progress on installation of pretreatment fine screening system.
- Integrate best management practice structure into gravel areas to be paved.
- Re-initiate monthly bacterial sampling as part of the TMDL for Moores Creek Implementation Team.
- Eventual upgrade of nutrient removal technologies (upcoming regulations will play a large role in this large capital improvement project).

Resource Reduction

Accomplishments:

- New carpeting in Administration Conference Room and other office consists of 25% recycled content.
- New financial staff furniture consists of recycled materials.
- Increased purchases of recycled content paper types.
- Switched to rechargeable Nickel Metal Hydride (NiMH) batteries where appropriate.
- Implemented Styrofoam peanut and bubble wrap packing recycling program.
- Plan to replace monitors with low energy, low hazardous material content monitors as new computers are needed.
- Developed SOP on beneficial reduce, reuse, and recycling practices.

Future Goals:

- Fully implement green purchasing program, concentrating on purchasing sustainable, non-toxic materials.
- Purchase hybrid vehicle.
- Transition to B20 biodiesel.

Septage Receiving

- Developed SOP to include training.
- Upgrade drainage system to capture runoff from this area for in-plant treatment.

Bypasses/Overflows

- Developed SOP for anticipated high inflows and bypasses.
- Developed SOP for post-sanitary sewer overflow actions.

Pretreatment

- Brought several plans into one SOP.
- Contacted City and County on pretreatment coordination.

Resources

Over the two-year implementation period from January 2003 to December 2004, costs included \$30,000 for inclusion in the EPA program, with expenditures for personnel time, travel to workshops, t-shirts, food for meetings, auditor training, and co-hosting of a Charlottesville workshop in June 2004 totaling \$49,000 and 1,820 hours. These costs are viewed as an investment in Rivanna and have had positive impacts beyond the fenceline. In addition, \$11,000 was spent for purchase and implementation of Intelix's IsoSoft environmental management software, a cost-share with the City of Charlottesville. The software has proven valuable beyond the fenceline EMS as it is used for safety and compliance throughout both Rivanna Authorities.

Next Steps

The goal is for all of the facilities within the RWSA as well as the Rivanna Solid Waste Authority to have functioning EMSs. RWSA and the City of Charlottesville have been working closely on EMS development; with RWSA and the City's influence, Albemarle County and the University of Virginia have recently decided to implement EMSs as well.

On November 24th, 2004, the Moores Creek WWTP was accepted into the Virginia Department of Environmental Quality's Environmental Excellence Program with an Environmental Enterprise (E2) designation. With this designation comes potential reductions in annual environmental permit fees and the ability to gain the next level of certification, Exemplary Environmental Enterprise (E3). The RWSA plans on applying for E3 status by the Fall of 2005.

During the June 2005 workshop, a lead operator and mechanic were trained as internal auditors, and the internal audit of the Moores Creek EMS (with EPA assistance) took place in December 2004. Findings included the need for increased documentation of on-the-job training, and an enhanced emergency management plan. Positive findings included stormwater retrofits, a proactive watershed approach, and employee enthusiasm for the program.



In January 2005, EMS implementation began at the South Rivanna Water Treatment Plant. This facility includes a dam, raw water pump station, and hydroelectric plant. Experience from the Moores Creek WWTP has proved invaluable for the EMS planning process and the goal is to complete implementation by December 2005.

Management Commitment

The Rivanna Water & Sewer Authority supports the on-going Environmental Management System developed at our Moores Creek WWTP and will encourage its practices to become a part of other operations as well. The positive results from such an initiative are a critical part of fulfilling our mission, and support our desire to be recognized in our community as stewards of the environment, beyond regulatory compliance and aimed toward the future.

- *Tom Frederick, Executive Director*



Sacramento Municipal Utility District Sacramento, California

Profile

When the first electric light bulb flickered on in Sacramento on September 8, 1879, an enthusiastic crowd of 5,000 cheered. To people accustomed to candlelight and gaslight, electric light was dazzling. Two local businessmen thought electricity had a good future and started their own electric companies. By 1885, electricity from their steam generators was lighting the Capitol grounds, four downtown streets, and a bandstand in the park. Over time, horse-drawn cars gave way to electric street railways.

But the coal needed for those steam generators was expensive. A local businessman, Horatio Gates Livermore, and an investor, Albert Gallatin, decided to create more affordable electricity. They built the Folsom Dam and Powerhouse on the American River. Folsom powerhouse first pumped 11,000 volts of electricity to Sacramento's Station A on July 13, 1895. In September, Sacramento celebrated with an electric parade and a nighttime display of lights that could be seen 50 miles away.



It was the start of the electric age, when even ordinary working people could afford the light and comfort that electricity could bring. Electricity use grew in Sacramento over the next 20 years. However, multiple distribution systems meant reliability was not ideal. Many people had no electricity at all. Prices fluctuated dramatically.

In the early 1920s, federal legislation made it possible for cities across the U.S. to set up municipal utilities -- nonprofit electric companies owned by the people who actually used the electricity. In city after city, municipal utilities were bringing lower, more stable electric rates and more reliable electric systems. On July 23, 1923, voters in Sacramento County followed the trend by creating the Sacramento Municipal Utility District (SMUD). The citizens of Sacramento became the owners of their electric company, with the power to set its rates and determine its policy through their elected representatives.

Although the voters created SMUD in 1923, the District could start operations only when it acquired funding and bought the distribution system from its current owner. A series of bond sales in the 1930's accomplished the funding. But the owner didn't want to sell its distribution system for the set price. In April 1946, after 12 years of litigation, the California Superior Court ordered the owner to transfer title of Sacramento's electric distribution system to SMUD for \$13 million. After 23 years of paperwork, SMUD was at last to become a working municipal utility. There was no formal ceremony, no changing of the guard, no champagne at midnight when

SMUD took over the operation of Sacramento's electric distribution system on New Year's Eve, December 31, 1946.

Today, a seven-member Board of Directors elected for staggered four-year terms governs the Sacramento Municipal Utility District. The Board of Directors determines policy for the District and appoints the General Manager, who is responsible for the District's operations.



SMUD currently is the nation's sixth largest community-owned electric utility in terms of customers served. SMUD serves about 1.2 million residents in its 900 square mile service area, which includes most of Sacramento County (including Sacramento, the capital city of California) and a portion of Placer County. To meet this power requirement, SMUD has developed an integrated generation portfolio that includes renewable energy sources such as hydro, photovoltaic, and wind, as well as natural gas-fired cogeneration. In a typical year,

this portfolio provides about one-half of the power demand of SMUD's customers. Other power is provided for through long- and short-term power contracts. SMUD's all-time record peak demand of 2,809 megawatts occurred on July 22, 2003.

Fenceline

The fenceline for initial EMS establishment within SMUD include discrete operations within the Power Generation Department of the Energy Supply Business Unit. The Energy Supply Business Unit currently has 392 employees and is responsible for providing reliable electrical energy and ancillary service products to its retail and wholesale customers at a competitive price and in a safe and environmentally responsible manner. The following operations are included in the EMS fenceline:

- Gas Pipeline Assets – Operate and maintain 76 miles of natural gas transmission pipeline.
- Hydro Generation – Operate and maintain hydroelectric generation facilities including eleven reservoirs and eight powerhouses.
- Thermal Generation – Operate and maintain four natural gas-fired generation plants.

Additionally, the vehicle service & repair shop and the materials warehouse at the hydro field office opted into the initial EMS fenceline. These operations are managed through SMUD's Administrative Services Business Unit.

Core Team

The 11-member core team includes the asset owners for the gas pipeline, hydroelectric facilities, thermal generation plants, vehicle service & repair shop, and hydro materials warehouse as well as the superintendent for generation maintenance and the supervisor for generation engineering. The core team is rounded out with four personnel from Safety Health & Environmental services, two of which have the role of environmental management representative (EMR). Senior

management sponsors of the EMS initiative are power generation's department manager and the assistant general manager for the Energy Supply Business Unit.

Key Drivers for Adopting an EMS

Four years ago, SMUD reorganized and decentralized a single corporate Safety Health & Environmental Services department into three discrete groups reporting through SMUD's three primary business units – Energy Supply, Energy Delivery & Customer Services, and Administrative Services. A rationale for the reorganization was to more closely align safety health and environmental resources and programs with the affected operations. Associated with the reorganization, SMUD's executive management directed operations management to implement an EMS to provide added structure, organization, management oversight, and compliance assurance associated with environmental affairs. The Energy Supply Business Unit, because of its potential for environmental impacts from electrical power generation and its highly regulated nature (i.e., by environmental laws and standards) was selected to initially implement and pilot an EMS within SMUD. Additional drivers and organizational goals for implementing EMS at SMUD include:



- Reduce loss of institutional knowledge from staff retirement and turnover;
- Better define the operational roles and responsibilities for environmental management;
- Improve awareness, communication, and integration of environmental protection within operations; and
- More closely align operational environmental performance with SMUD Board strategic direction and Executive Management policy.

Significant Aspects and Impacts

The core team used a process of identifying operational activities and environmental aspects using input/output diagrams followed by ranking aspect significance based on criteria addressing environmental, natural resource, socioeconomic, community, and regulatory considerations. Seven operational activities and aspects were initially identified as significant within the fenceline.

Objectives and Targets

The core team considered SMUD's environmental protection policy, legal obligations, significant environmental aspects, business and financial realities in setting the following objectives and targets:

- Investigate measures to reduce noise and natural gas venting during normal gas pipeline operations;

- Develop and implement public outreach policy to preclude pipeline relocation encroachments and their resulting construction environmental impacts;
- Reduce air emissions from emergency standby generators in hydro operations via replacements with new, lower emitting units;
- Conserve water by repairing leaks in hydro power tunnel and canals;
- Conserve water through recycling efforts in thermal generation plants;
- Reduce air emissions and conserve natural gas by reducing operation of an auxiliary steam boiler in a thermal generation plant;
- Reduce risks for emergency response and accidental spills by removing surplus fuel oil from storage at a thermal generation plant; and
- Implement pollution prevention measures in the vehicle and service and repair shop serving the hydro field office.

Benefits of Adopting an EMS

Benefits to date from implementing objectives and targets include the following:

- Proceeding with installation of a new diesel emergency standby generator with NOx emissions three times lower than the existing diesel generator.
- Proceeding with installation of a new propane emergency standby generator with NOx emissions nearly ten times lower than the existing gasoline generator. Gasoline fuel storage at this site will also be eliminated.
- Completed repair of a hydroelectric tunnel leak. Preliminary estimates of water savings are about 800 acre-feet per year, which represents 1,000 to 2,200 MWh of generation valued at \$50 to \$110 thousand.
- Conserving approximately 140 million cubic feet of natural gas per year with a value of \$680,000 per year, by implementing a contract change to reduce operation of an auxiliary steam boiler. This also reduces future air emissions by approximately one ton per year of NOx plus VOC (i.e., ozone precursors) and 7,200 metric tons per year of CO₂ greenhouse gases.
- Completed removal of 80,000 gallons of surplus fuel oil from a thermal generation plant, receiving about \$37,000 for its value, and reducing ongoing risks of accidental spills and releases.
- Received certification by the California Department of Toxic Substances Control as a Pollution Prevention (P2) Model Shop for vehicle service and repair operations at the hydro field office. The hydro vehicle service and repair shop reduces hazardous waste by using water-based parts washing instead of solvents, uses refillable spray bottles instead of disposable aerosol cans, uses re-refined oil and an oil analysis program to increase oil change intervals, and uses dry shop spill cleanup methods.

Resources

Over the two-year period, SMUD committed 1,964 direct labor hours and \$133,020 in direct labor costs for EMS implementation activities.

Next Steps

SMUD plans to continue implementing EMS within the fenceline and assess opportunities to expand EMS to other departments and work areas. Improvements to the environmental aspects analysis are expected during the upcoming review cycle, which will enhance a needs assessment and prioritization of operational controls. Additional employee involvement will be pursued in the upcoming EMS review cycle to expand ownership of environmental protection. SMUD does not intend to pursue ISO certification at this time.

Appendix A:

Glossary of EMS Terms

Accreditation: Formalized procedure by which an authoritative body formally recognizes that an organization or facility is competent to carry out specific tasks and/or meets specific accreditation requirements.

Audit: A planned, independent and documented assessment to determine whether agreed upon requirements are being met within an organization.

Audit Cycle: The period of time in which all the activities in a given site/facility are audited.

Audit team: Group of auditors, or a single auditor, designated to perform a given audit; the audit team may also include technical experts and auditors-in-training. Note: One of the auditors on the audit team performs the function of lead auditor.

Certification: The environmental management system of an organization is certified for conformance with ISO 14001 after it has demonstrated such conformance through a formal audit process through a third party.

Certification body: A third party that assesses and certifies/registers an organization's environmental management system with respect to published environmental management system standards and any supplementary documentation required under the third party's certification system.

Compliance: An affirmative indication or judgment that the supplier of a product or service has met the requirements of the relevant specifications, contract, or regulation. Comparable to conformance.

Conformance / Conformity: An affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation. In terms of ISO, conformance to ISO 14001 certification requirements - comparable to compliance.

Continual improvement: The recurring process of enhancing the EMS in order to achieve improvement in overall environmental performance consistent with the organization's environmental policy. This widely adopted principle is intended to ensure that an organization does not simply adopt an environmental management system for cosmetic purposes and thereby remain static, without commitment to reduce its impact on the environment.

Document: Information and its supporting medium (Note: the medium can be paper, magnetic, electronic or optical computer disc, photograph or master sample, or a combination thereof.)

Emergency response plan: A formal, detailed plan that describes an organization's specific logistics and reporting requirements in the event an emergency, such as fires, erosion or spills. A fundamental element of an environmental management system.

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. (Note: a significant environmental aspect has or can have a significant environmental impact)

Environmental Impact: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

Environmental Management Representative (EMR): The clearly identified environmental management system team leader who has responsibility for the planning and facilitating an organization's environmental management system from start to finish and has the designated authority of senior manager to get the job done.

Environmental Management System (EMS): Part of the organization's management system used to develop and implement its environmental policy and manage its environmental aspects. A set of interrelated elements used to establish policy and objectives and to achieve those objectives. Includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources.

Environmental Management System Audit: A systematic, documented verification process of objectively obtaining and evaluating an organization's environmental management system to determine whether or not it conforms to the environmental management system audit criteria pre-defined by the organization, and for communication of the results of this process to management.

Environmental Objective: Overall environmental goal, consistent with the environmental policy, that an organization sets itself to achieve, and which is quantified where practicable.

Environmental Performance: Measurable results of an organization's management of its environmental aspects. Results can be measured against the organization's environmental policy, objectives and targets and other environmental performance requirements.

Environmental Policy: Overall intentions and direction of an organization related to its overall environmental performance as formally expressed by top management.

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.

Fenceline: The area in which an organization chooses to implement its environmental management system – a department, division or specific operation.

Interested Party: Individual or group concerned with or affected by the environmental performance of an organization.

ISO: The International Organization for Standardization (ISO) is a worldwide federation of national standards bodies from some 140 countries, one from each country. ISO is responsible for the development of ISO 14001.

ISO 14001: An international voluntary standard for environmental management systems. This is one standard in the ISO 14000 series of International Standards on environmental management.

Lead auditor: Person qualified to manage and perform environmental management system audits.

Non-conformity: The non-fulfillment of a specified requirement.

Observation: A practice within an organization's operations, while not in strict violation of environmental management system requirements, which can make conformance difficult or potentially provide an opportunity for error. Examples include overly difficult processes, poor housekeeping, and inadequate personnel training.

Organization: Company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration. For organizations with more than one operating unit, a single operating unit may be defined as an organization.

Prevention of Pollution: Use of processes, practices, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of resources and material substitution.

Pollution Prevention: Use of processes, practices, techniques, materials, products, services or energy to avoid, reduce or control (separately or in combination) the creating, emission or discharge of any type of pollutant or waste, in order to reduce adverse environmental impacts.. Any activity that reduces or eliminates pollutants prior to recycling, treatment, control or disposal.

Procedure: Specified way to carry out an activity or a process

Record: Document stating results achieved or providing evidence of activities performed.

Registrar: Third-party entity which audits and registers an organization's environmental management system with respect to the ISO 14001 environmental management system standard.

Stakeholders: Those groups and organizations having an interest or stake in a organization's environmental management system program (e.g., regulators, shareholders, customers, suppliers, special interest groups, residents, competitors, investors, bankers, media, lawyers, geologists, insurance companies, trade groups, unions, ecosystems and cultural heritage).

Verification: The act of reviewing, inspecting, testing, checking, auditing, or otherwise establishing and documenting whether items, processes, services, or documents conform to specified requirements.

Waste Minimization: The use of source reduction and/or environmentally sound methods and practices that reduces the quantity and/or toxicity of pollutants entering a waste stream prior to recycling, treatment, or disposal. Examples include: equipment or technology modifications, reformulation or redesign of products, substitution of less toxic raw materials, improvements in work practices, maintenance, worker training, and better inventory control.

Appendix B:

Summary of Implementation Phases and Workshops

Pre-Phase Activities

To prepare for Phase I, the participants were asked to come to the first workshop having identified the person or persons who would lead the EMS implementation for their respective organization – their Environmental Management Representative (EMR). Most participants in the third initiative selected one person as the EMR while two of the nine organizations decided to share the responsibilities between two people. The participants were also asked to identify the area in which they would implement the EMS. This area, which is commonly referred to as the EMS “fenceline”, can vary from organization to organization based on their individual needs, objectives, and resources. However, GETF strongly encouraged each participant to select one operation or department as their fenceline. Starting with a smaller fenceline allows the participants the opportunity to capture lessons learned, keys to success and good practices that could be applied as the scope of the EMS is expanded to additional operations within the organization. Several organizations indicated throughout the program that limiting the scope of their initial EMS fenceline was critical to their initial success with implementation and would have proved an immense barrier if a larger fenceline would have been selected.

Phase I – Getting Ready

January 2003 – May 2003

The focus of Phase I was to lay the foundation for the development and implementation of the EMS. This involved:

- Establishing and training the EMS Core Team;
- Developing process flow diagrams for the operations and activities within the designated “fenceline”;
- Conducting a Gap Analysis;
- Understanding organizational goals at the various levels and functions in the fenceline; and
- Identifying internal and external stakeholders for outreach efforts and raising EMS awareness.

Summary of Phase I

The first workshop, hosted by a second initiative participant Jefferson County, AL, provided training on how to structure and initiate the implementation process – identifying who would be involved with the hands on elements of developing and implementing the EMS and preparing top management on what was to come. The level of understanding concerning the EMS concept varied from participant to participant. Some EMRs arrived as the “champions” of the effort, having served as the internal driver within the organization. Others had the EMS responsibility appointed to them and were looking for a considerable amount of guidance. The group received an overview of “what is an EMS” to ensure everyone started from the same point. During the training, GETF, with help from Jefferson County EMS practitioners, emphasized the importance of integrating the EMS into the overall organizational management structure and ensuring shop floor understanding and buy-in. The EMS is not meant to be a stand-alone tool. Therefore, it is important that opportunities for integration are identified early in the process to eliminate redundancy and to help ensure the EMS is on its way to being institutionalized. Many

organizations discover during the gap analysis process that several elements of the EMS exist or partially exist within the organization prior to implementation and can simply be incorporated and refined to meet EMS requirements. In addition to GETF's training, the participants received insight on the EMS process from panelists representing the North Carolina Zoo and U.S. Steel, both ISO 14001 registered organizations.

Establishing and Training the EMS Core Team

The Core Team plays an instrumental role in implementing the EMS. They have a vital leadership role in planning the EMS project, delegating tasks, establishing deadlines, collecting and evaluating the EMS work products, and providing training, guidance and assistance where needed. The Core Team functions in an advisory capacity, enlisting "buy-in" and collecting and disseminating EMS information across the entire organization, and providing guidance and leadership as the requirements are being addressed. As such, the participants were advised to choose a Core Team that was cross functional and that had plenty of institutional knowledge.

Management needs to make it clearly understood that the Core Team members need adequate time to fulfill their EMS responsibilities. In addition, the Core Team needs EMS training prior to the start of the implementation initiative. The training should be an overview of the EMS requirements and include a review of their roles and responsibilities and the associated time commitment. The Core Team must approach the Implementation Phase with a clear idea of how each of the EMS elements can be integrated within the current programs and procedures.

Conducting a Gap Analysis

The Gap Analysis serves as a tool that can identify what EMS elements may already be in place and where the organization needs to focus its effort. Prior to the start of the project, GETF emphasized that most organizations have up to 85% of what is needed, in one form or another, to satisfy EMS requirements. This typically revolves around the organization's regulated activities.

Participants were encouraged to conduct a gap analysis to identify what EMS elements may already exist in their organization and also as a learning tool to understand better the individual requirements of the ISO 14001 International Standard. Taking into

"During the first phase of EMS implementation, several areas for improvement were identified. The shop employees were open to new approaches and the management is embracing the recommended changes".

- Pete Dubois, EMR, Clark County, WA

consideration the participants' lack of familiarity with EMSs, GETF provided the participants with a gap analysis checklist made up of questions to explore. GETF altered the approach from past initiatives by adding specific references to the ISO 14001 Standard within the checklist to facilitate a working understanding of the guidance document and requirements much earlier in the program. Many of the participants found this exercise to be a challenge, but saw value in it because it introduced them to the systems concept and ultimately refined their expectations of the program. Through the Gap Analysis, numerous participants found that many of the EMS requirements were being met, but were not documented as a procedure or work instruction and that many elements just needed to be linked together and managed under a single "umbrella".

This activity also established early buy-in and a sense of camaraderie among Core Team members in several organizations. In order to complete the gap analysis, several EMRs found it valuable to begin delegating specific responsibilities and actions to individual team members – an invaluable technique to institutionalizing the EMS within an organization.

Identifying Stakeholders

During the first training session GETF engaged the participants in an exercise to identify stakeholders – inside and outside the organization – that may or may not have an interest in the organization’s environmental performance. This exercise left each participant with a list of stakeholders, categorized by their level of interest in the organization’s environmental issues and potential effect on their organization. This list was used to help the participants identify how and what would be communicated to each of their stakeholders and made the point that different stakeholders often require unique approaches and forms of outreach.

GETF placed additional emphasis on stakeholder identification to improve and increase communication concerning each organization’s EMS effort.

All of the participants made regular efforts to communicate information about their EMS efforts through press releases, newsletters, websites, brochures, and presentations. For many of the participants, community leadership was a key driver for why they chose to implement an EMS in the first place. Therefore, external outreach was a natural component of EMS implementation. For example, the Kent County Wastewater Facility and the Rivanna Sewer and Water Authority both invited a group of stakeholders to serve in an advisory capacity throughout the implementation. In addition, several organizations developed EMS logos (see example on the right) to promote and give an identity to their efforts, which further helped to communicate the organization’s commitment and approach to environmental management.



Phase II – Planning

June 2003 – September 2003

Phase II of the initiative focused on the planning elements of an EMS. Participants identified the operations and activities that would be the foundation of their efforts. As such, this phase involved:

- Identifying the significant environmental aspects & impacts of the operations and activities within the fenceline;
- Developing an environmental policy signed by top management;
- Identifying the legal and other requirements;
- Establishing objectives and targets;
- Setting measurable objectives and targets and performance indicators;
- Writing system procedures; and
- Establishing document control and record management.

Summary of Phase II

Phase II marked the start of the EMS development and on-the-ground implementation process. At the Phase II workshop, hosted by Clark County, WA, the participants were introduced to environmental aspects and impacts and the process of identifying and categorizing them. Assisted by the

"Once again, a group of local governments are beginning to see the real-world benefits of adopting environmental management systems. We are very pleased with the energy and enthusiasm shown by the group that met in Vancouver. They are now entering into a critical phase of their EMS development and we look forward to learning more about their experiences. EMSs are all about improving performance and changing the ways in which organizations view and manage a wide array of environmental issues".

- James Horne, U.S. EPA National Project Manager

Zero Waste Alliance, a PEER Local Resource Center located in Portland, OR, GETF used real-world scenarios, hands-on work sessions, and sample documentation examples to help participants prepare for the task ahead. As an added benefit to participants, a group of EMS practitioners from the first two U.S. EPA-supported EMS pilots and other public entities in the region participated in the training by sharing their knowledge, experiences, and expertise in EMS implementation.

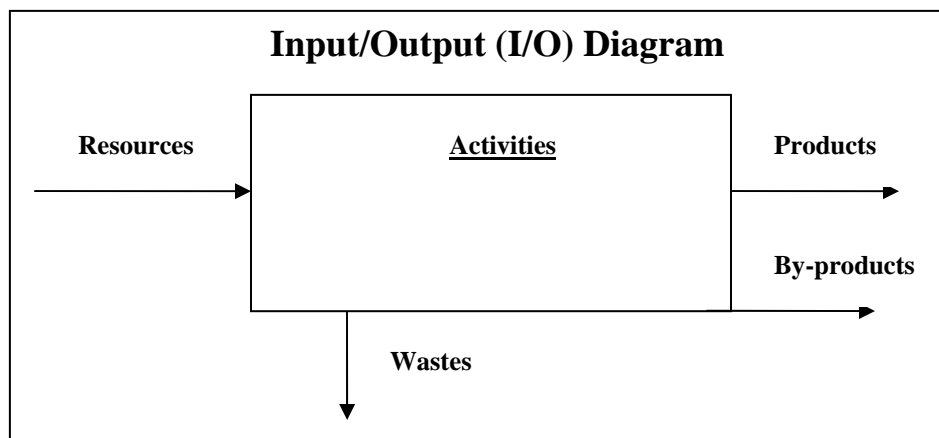
After the training session, participants were tasked with returning to their organizations to begin addressing the planning elements of an EMS. The bulk of the participants' effort revolved around identifying the environmental aspects and impacts of their fenceline activities and operations, and applying consistent criteria to prioritize those that were the most significant. This task provided the Core Team and Implementation Teams the opportunity to start working together, further developing a team dynamic.

As experienced in the first two initiatives, phase II involved some of the most challenging tasks. The participants that had difficulty with aspect identification took early advantage of the site visit by GETF to assist with finalizing the aspect identification process and securing top management buy-in and support. During the aspect analysis process, GETF continually reminded participants of one main key to success, keep it simple. The first time that organizations worked through the aspect identification activity, more often than not they got bogged down and begin to over-analyze their operations.

Identifying Significant Aspects

The determination of significant aspects is extremely important as it establishes the basis for building all of the other elements of the EMS. Therefore, the focus of Phase II was to identify the environmental aspects and impacts of each organization's operations and activities and determine which ones were significant. At the workshop, participants received training on how to identify their organizations' environmental aspects and impacts as well as develop the criteria that would determine significance.

To facilitate the aspect identification process, participants were encouraged to use input/output diagrams (see below) to assess individual activities within their EMS fencelines and document inputs, outputs, wastes, and by-products as a means for assessing actual and potential environmental impacts, both positive and negative. Input/output diagrams were developed for



each individual activity within the defined EMS fenceline. Several participants successfully utilized this approach and felt that it provided a simple, but effective means to promote analysis and discussion among the

Core Team. The results of collective diagrams were then transferred to a single table for ranking and significance determination.

After finalizing the list of aspects and impacts the participants then had to generate significance criteria that would be applied against the aspect and impact list. The criteria would act as a filter to identify a list of significant aspects. The responsibility of developing significance criteria typically rested with the Core Teams. Participants selected criteria that their team's felt allowed them to fully differentiate the significance of each identified aspect. Criteria not only focused directly on environmental issues, but more often than not organizations also included criteria for business effects, public image, employee safety and health, and likelihood or probability. Most organizations utilized between 5-6 criteria in their respective assessments. The following were the most commonly utilized significance criteria:

- Severity of impact
- Frequency of occurrence
- Change to environment (air, water, soil, and/or biological resources)
- Persistence and toxicity
- Worker exposure
- Public perception
- Cost/ease of change
- Nuisance (i.e., odor)
- Regulatory and legal exposure

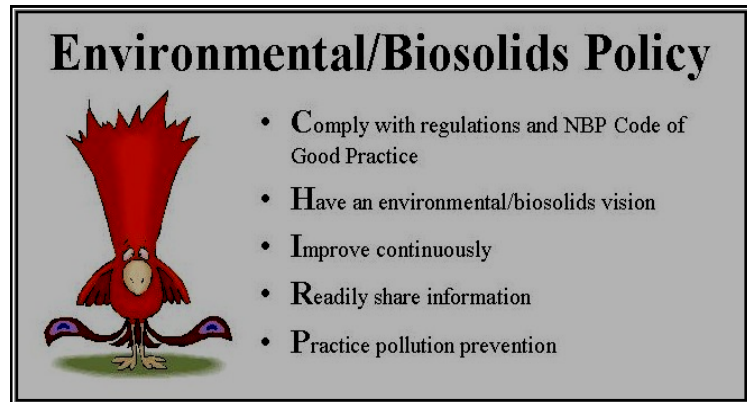
Several organizations decided to apply weighting factors, utilizing various approaches and formulas, as they felt that certain criteria were more important. In every situation (i.e., with or without weighting factors), participants employed simple numbering systems (based upon High (5), Medium (3), Low (1)) for ranking aspects. Where team members could not establish unanimous agreement a 2 or 4 were selected. Once participants worked through the process for identifying significant environmental aspects, each organization documented their approach into a system procedure. This procedure specified roles, responsibilities, and the frequency with which an aspect review will be conducted.

Developing an Environmental Policy

The environmental policy serves as the driver for an organization's EMS. It describes the organization's commitment to the environment and delineates its environmental goals. The policy, at a minimum, should include three main commitments:

1. Compliance
2. Pollution Prevention
3. Continuous Improvement

As such the policy is a document that needs to be approved by the organization's top management. Several organizations made the decision to postpone the finalization of their Environmental Policy until completion of the significant aspect analysis. Their rationale was that they wanted to develop a policy that captured their commitment to the environment and could be more specific to their particular impact and potential for stewardship. Three of the nine organizations developed slogans to further give their EMS and policy an identity, an approach that also served as an effective training technique for staff to fully understand the organization's policy commitment. The example to right, from Kent County, was further promoted on magnets, wallet cards, and coffee cups.



Adopted by Levy Court on December 8, 2003

Identifying Legal and Other Requirements

The environmental policy includes a commitment to compliance. To achieve this commitment the participants were required to identify and inventory their applicable state and federal regulatory requirements and develop a written procedure for this process. In addition, the 2004 ISO Standard now requires increased focus upon organizations conducting routine compliance assessments or status checks.

As was the case with past initiatives, several of the participants did not have a systematic, documented process for identifying applicable local, state and federal regulatory requirements. Responsibility typically fell to either one or a handful of individuals throughout the organization. Often, in the case where this responsibility fell to multiple personnel, a lack of communication was typical, resulting in redundancy, overlap and gaps in collecting and disseminating this information. In other instances, area managers were responsible for identifying legal requirements through their personal sources of preference, without a consistent process to ensure effectiveness. Each organization participating in the third initiative realized significant benefits through implementation of this EMS element, resulting in a streamlined and standardized process for monitoring legal requirements and instilling a working understanding of the relevant components into everyday operations. Participants in the program identified and rely upon

varying sources of information, both public and fee-based services depending upon the nature of their operations.

Establishing Objectives and Targets

Objectives and Targets provide an opportunity for an organization to improve upon its operations, specifically in those areas associated with a significant aspect. Many of the participants set objectives and targets around their lists of significant aspects, but are not required by the ISO 14001 Standard to assign objectives and targets to every significant aspect. Some participants had the Core Team establish the objectives and targets while others solicited input from various levels throughout their organization. The participants reported that the more they solicited input from the various levels in their organizations the greater the opportunity to take advantage of a broad level of knowledge and expertise. Input from the shop floor typically identified areas that weren't originally considered.

In all cases GETF recommended that the objectives and targets be approved by management in light of the resource requirements that were needed to achieve the objectives and targets. Obtaining their approval also keeps management closely aligned with EMS implementation and ultimately maintenance. Plus, early and continuous involvement will greatly facilitate the effectiveness of the management review process.

The following are example objectives and targets as established by third initiative participants:

Objective	Target
Modernize fleet within budget constraints	Reduce emissions 10% per year for 4 years
Maintain fleet to run cleanly & efficiently	Reduce emissions 10% per year for 4 years
Reduce Air Pollution	Reduce sulfur, particulate and CO emissions by 50% from CY 2002 levels
Reduce Energy Consumption	Reduce electricity usage by 20% from CY 2002 levels
Reduce or eliminate effects of chlorine and sulfur dioxide	Improve safety of existing processes or switch to an alternative disinfection method
Reducing sanitary sewer overflows	Reduce SSOs by 40% from CY 2002 levels
Reduction of Exhaust Emissions	Reduce NOx, CO, CO2, and Hydrocarbon emissions, in pounds, by 5% from all motorized equipment and vehicles (excluding heavy equipment) to be completed by July 1, 2005.
Prevent Surface Water Pollution from Fuel Spills	Implement Best Management Practices to reduce number of fuel spills by 75% by July 1, 2005
Reduce Consumption of Fossil Fuel Based Lubricants	Reduce consumption of fossil fuel based lubricants by 5% by July 1, 2005

Increase use of alternative fueled vehicles	100% low sulfur diesel by 2007; Compressed Natural Gas (CNG) used in dedicated departmental vehicles (1 department by 2004); and additions & replacement of midsize passenger vehicles with hybrids.
Reduce water usage	Put in water meter for Building C; establish baseline; and reduce use by 10% by 2005
Reduce sanitary sewer overflows	Rehab all manholes by September 2006

Develop Environmental Management Programs

Environmental Management Programs (EMPs) are the vehicle used to achieve the established objectives and targets. EMPs outline who (roles and responsibilities), how (resources), and when (timeframe and milestones). The participants reported that they enjoyed this element of the EMS because it allowed them to be creative in how they achieved the objectives and targets and provided a clear-cut path for follow-up, management, and monitoring of performance. For some, the objectives and targets were established to go beyond compliance to improve environmental performance. This was viewed as an opportunity to “do something good” and also served as guidance for organizations not traditionally accustomed to moving beyond regulated activities.

Phase III – Implementation

October 2003 – March 2004

Phase III marked where the EMS implementation process began to involve employees in the operational activities in even more of a substantial way than in previous phases. The elements addressed in this phase are the heart of the EMS. Emphasis was placed on two areas – managing significant aspects and developing environmental management programs to achieve objectives and targets, both of which involve a wider range of personnel throughout the organization.

Managing Significant Aspects

- Developing written procedures, including operational controls to ensure proper management of significant aspects;
- Develop a procedure to ensure documentation essential to the EMS are controlled;
- Records management;
- Clearly identify roles and responsibilities as they relate to specific EMS activities and managing significant aspects;
- Ensure all personnel have been trained;
- Establish internal and external lines of communication; and
- Emergency preparedness and response.

Develop Environmental Management Programs

- Roles & Responsibilities;
- Resources; and
- Timeframe and milestones.

Summary of Phase III

The Phase III workshop signified the mid-point of the project and offered participants an opportunity to assess their work towards attaining specific milestones. The workshop was held at the Orange County Convention Center in Orlando, Florida and began with individual participants sharing their experiences through the first two phases during a “year one reflection” session. This workshop utilized “train-the-trainer” style sessions to teach participants how to fully prepare their respective staffs back at their own facilities and plan accordingly to accomplish phase III activities. Leveraging the outstanding training abilities of University of Florida TREEO Center, a PEER Local Resource Center located in Gainesville, FL (www.treeo.ufl.edu/ems/), GETF utilized hands-on work sessions and real world, practical examples to help participants prepare for the task ahead. Appreciating the value of peer-to-peer exchange, GETF and the TREEO Center assembled a group of EMS practitioners from within the region to share their knowledge, experiences, and expertise in EMS implementation through a series of focused panel discussions. Panelists represented Eglin Air Force Base, Orange County Utility, Jefferson County, Alabama, Defense Supply Center Richmond, and the Virginia DEQ.

In addition, each of the participating organizations were represented at the workshop by a member of top management, whom spent one afternoon participating in a roundtable discussion covering a variety of topics related to EMS implementation, including drivers, benefits, challenges, and future goals. The setting was kept informal, which resulted in a frank and informative sharing of management-level views and opinions. A summary of key remarks, entitled Management Roundtable Summary, is provided in the appendices.

Operational Controls

The management of significant aspects is the core of an EMS. To ensure proper management, organizations are directed to develop documented procedures that guide how activities associated with a significant aspect, are to be conducted. Many of the participants, through the gap analysis exercise, identified that many procedures existed but were not documented.

Each participant utilized the expertise of the Implementation Teams or shop floor personnel to review, develop and document work instructions that would be used to ensure proper management of the significant aspects. Each Team evaluated existing operational procedures, training materials and emergency response plans to determine their suitability. As the Teams developed the work instructions/procedures they also identified personnel responsible for managing the significant aspects, identifying associated documentation and records, identifying training requirements, communication needs, operational controls and maintenance needs, and, when required, appropriate emergency response actions. Several organizations developed matrices to ensure that “all bases were covered” with respect to managing each individual significant aspect.

The participants saw significant benefit in this exercise, as most commented that the tasks resulted in greater awareness and understanding of operations and an opportunity to build enhanced communication channels throughout the organization. For example, Kent County tasked an intern, whom was working towards a Masters degree in environmental management, to

monitor individual activities, ask responsible personnel technical questions, and document processes through a combination of flow charts, pictures, and text. The result was complete documentation of significant aspect activities (i.e., institutional knowledge) and a reduced burden on full-time personnel for completing this EMS task. For Kent County, this effort will reap long term rewards as a significant proportion of operators (several with more than 30 years of experience) will retire in the coming years.

Most participants noted the exercise to document procedures captured the knowledge of the most experienced personnel eliminating the need to pass information to new employees through word of mouth and integrating an effective transition. The procedures will be used in formal new employee orientation training sessions and provide greater consistency throughout multiple shifts as best management practices will become business as usual.

Training

Training plays a vital role in the success of the EMS. Training is a means to increasing the overall environmental awareness of the organization and ensuring personnel properly fulfill their responsibilities associated with managing significant aspects.

General environmental awareness training provided the opportunity to introduce personnel to the environmental policy, review roles and responsibilities, and the potential consequences of departing from specified procedures. The awareness training provides the message that everyone in the organization has a roll in making sure the organization fulfills the commitments in the environmental policy. Many of the participants created promotional materials that were used in the awareness training. Several organizations leveraged materials developed by participants in prior EMS initiatives, such as EMS awareness videos and posters. The videos included segments of top management expressing their commitment to the process and the importance of participation throughout the organization.

Other participants developed mascots or logos, posters, brochures and internal newsletters as additional tools to promote the EMS effort and further build organization-wide awareness. Metro Waste Authority posted general EMS posters throughout their facilities during the initial stages of EMS as a means to generate curiosity and interest, including “coming soon...” and “team members wanted...” type announcements.

Additionally, personnel who work with significant aspects need to be trained to ensure they are knowledgeable about their tasks and responsibilities. This is referred to as competency training. To determine competency, some of the participants used one or a combination of the following: 1) personnel are required to sign-off that they reviewed work instructions/procedures and understand them and/or 2) job specific training (e.g. hazardous awareness training or union certification).

Documentation Control

Certain documents are essential to the establishment of the EMS framework and the management of significant aspects. To ensure personnel are fulfilling their responsibilities properly, it's a

requirement that they work from current documentation that has received the appropriate approval(s). A document control procedure needs to be established to ensure personnel are working from proper documentation, which results in consistent management of environmental responsibilities.

Prior to the implementation effort none of the participants had an existing process that directed the maintenance and control of relevant EMS documentation. As the participants ventured further into the project they found the amount of draft and approved documents growing considerably. Without a document control process Core Team members and other personnel risk working with obsolete documents. Once the document control process is established it reduces this concern significantly and creates consistency across operational controls and activities.

Records Management

Records are produced in the normal course of implementing an EMS, and they establish the benchmarks of how effectively the EMS is working. Records constitute objective evidence that an organization is actually implementing the EMS as designed, and that the EMS procedures and work instructions are being carried out. The participants were required to create a records management procedure that provided guidance on identifying, maintaining, retaining, and disposing of records. Several participants incorporated this component as part of their overall document management process. A key component of this element is ensuring that records are readily accessible and/or easily retrievable.

Communication

Many of the participants experienced an improvement with communication inside and outside their organizations and provided the opportunity for the participants to adopt formal documented procedures. Aside from the traditional correspondence with state and federal regulators, the participants opened lines of communications with various stakeholders outside the organization either through concerted efforts to reach out to stakeholders and/or incubation of formal advisory groups. For example, Rivanna Authority and Kent County invited specific stakeholders to serve in an advisory capacity and participate in process of identify environmental issues significant to them, reviewing objectives and targets, and suggesting enhancements to the overall EMS process.

The stakeholder analysis previously conducted in Phase I was an exercise that helped the participants identify and prioritize the key internal and external stakeholders.

The EMS process must also include a procedure for communicating between levels and functions inside the organization. Again, the organizations relied on informal procedures prior to the EMS initiative. The establishment of a formal procedure significantly strengthened the flow of information throughout each organization and served as a continued commitment to maintain communication channels. This is critical to the implementation process because employees at all levels in the organization play a role in ensuring daily management of environmental issues. For them to fulfill this role a mechanism needs to be established that ensures information flow top-down and bottom-up. Among the various approaches to communication include employee

newsletters, routine status and important EMS information emails, bulletin board posts, and regular meetings.

Emergency Preparedness and Response

The participants were required to establish and maintain a procedure for identifying and responding to accidents and emergencies related to the environment, and for mitigating the environmental impact of any emergencies that may occur. Recording emergency incidents is also key to EMS conformance. Regular testing of these emergency response plans, especially after any incidents occur, is a part of the EMS process. Many of the participants had existing elements of an emergency response program mostly through regulatory requirements (e.g. Spill Prevention Control and Countermeasure Plan) and this was simply a task of consolidating various components into an efficient, linked, and comprehensive process.

Phase IV – Check & Act

April 2004 – December 2004

The focus of this phase was to verify if roles and responsibilities were being fulfilled, assess whether regulatory requirements were being met, determine if objectives and targets were being achieved, and confirm whether or not the EMS is in place and functioning properly. Management also plays a critical role during this phase with an overall evaluation of how the EMS is doing.

- Monitoring and Measuring;
- Assessing Compliance;
- Calibration;
- Nonconformance and Corrective and Preventative Action;
- Internal EMS Audits; and
- Management Review.

Phase IV Summary

The Phase IV workshop was hosted by the City of Charlottesville. Once again, GETF leveraged the outstanding training abilities of two PEER Local Resource Centers, the University of Florida TREEO Center, located in Gainesville, FL (www.treeo.ufl.edu/ems/) and the Virginia Tech COTA program located in Roanoke, VA, (www.cota.vt.edu/vtems), and a second initiative participant Jefferson County, AL to assist with workshop training. This approach utilized the experience of several EMS Lead Auditors to fully prepare participants for phase IV activities. To prepare participants for internal auditing, trainers developed an interactive case study exercise that guided participants through the components of preparing for and conducting an internal audit. The exercise included team activities, a document review audit, and mock interviews. Jefferson County participated in the session and shared their experiences with the internal EMS audit process, management review, and third party certification, providing participants with invaluable practical knowledge.

Many of the participants commented that their efforts to implement the Phase IV elements brought the EMS together and helped them fully view their EMS as a “system”. In each of the

preceding phases the participants tended to address each element individually. Addressing the elements individually inhibited their ability to establish the linkages between the elements. Phase IV brought the EMS linkages into focus giving the participants the opportunity to step back and look at the big (EMS) picture.

Monitoring and Measuring

Monitoring, measuring, and evaluating are the activities that will allow an organization to determine whether it is making progress towards achieving its environmental objectives and targets. The participants were guided to also evaluate the operations and activities that have associated significant aspects - are they required to monitor or measure in accordance with state or federal regulatory requirements? As an example, do they need to monitor water or air quality? If calibrated instruments are required to monitor or measure, a process needs to be established to calibrate them on a periodic basis. A procedure needs to be developed that specifies how calibration and monitoring and measuring will be accomplished.

Assessing Compliance Status

Clearly stated in each organization's environmental policy is a commitment to compliance. To determine whether the policy commitment is being met, the participants need to develop or enhance an existing process where they can assess their compliance status. Most of the participants had an in-house "environmental" person that was responsible for keeping on top of regulations and implementing the requirements. Participants agreed that a compliance assessment can be successfully implemented either in-house or through a consultant, depending upon the internal resources and availability of outside support. In some instances, participants relied upon a combination of both to suffice EMS requirements and implement an effective process. If the process is to be conducted in-house, it is important that the personnel involved have the education, experience and training to do so. Participation in the national pilot project, and the participants' ability to share resources and expertise within the group, served invaluable to completing this element.

Nonconformance and Corrective and Preventative Action

Nonconformance and corrective and preventative action play an important role in improving the EMS and ultimately institutionalizing it as a continual improvement process. This process is used to address weaknesses or correct failures in the EMS. Nonconformance actions are typically generated through an EMS audit but can also be generated by any person in the organization as issues are identified. This is a valuable empowerment component of an EMS, as all employees assume responsibility for ensuring that the organization is doing what they can to reduce and in some cases eliminate environmental impacts, as well as ensure that future impacts are prevented. Once a weakness or failure is identified it requires the manager or personnel in the area of occurrence to identify why it happened and how to correct it – find and fix. This places the responsibility squarely on the shoulders of personnel throughout the organization. The process of improving the EMS becomes the responsibility of everyone in the organization not just the environmental personnel.

The participants were encouraged to record nonconformances for tracking over time. This allows the participants to identify any trends concerning weaknesses in the system where they would then be addressed accordingly. To reduce the amount of documentation in the system some of the participants embraced a find and fix approach for minor issues. Rather than inundate the system with documentation auditors and the Core Team would correct issues as they were identified. This served as an opportunity to educate personnel and reduce the burden previously required to have taken time to formerly respond. The ultimate goal of an EMS is to manage environmental responsibilities efficiently and effectively, not to get bogged down in administrative hurdles.

Conducting an Internal EMS Audit

The internal EMS audit is an opportunity to assess the health and functionality of the EMS. This requires a periodic assessment of EMS documentation and employees' roles and responsibilities concerning EMS specific tasks and managing significant aspects. The internal audit activity requires planning and preparation.

Either prior to the project or during the initial months a few of the participant EMRs completed an ISO 14001 Auditor Course, with some reaching out to PEER Local Resource Centers (www.peercenter.net/whocanhelp/lrc.cfm) for training expertise. They commented that formal training was very helpful when it came time to organize and conduct the internal EMS audit and enhanced personnel confidence in conducting an effective EMS audit. Some participating organizations located within the same region also relied upon each other to assist with internal auditing efforts. For example, Charlottesville and Rivanna Authority shared auditing resources as a means for having an outside party review their respective EMSs.

Many of the participants were uncertain what to expect for the first internal EMS audit. In light of the negative connotation associated with the word "audit" many of the participants emphasized the purpose and positive outcomes of an EMS audit and assured personnel there would be no punitive action associated with any part of the process. The audit process is intended to be helpful to the organization, and should identify both positive and negative conformance in a constructive manner. The participants viewed their initial audit efforts as a learning opportunity for the auditor, auditees, and the organization as a whole. In many instances, organizations relied upon personnel from outside their EMS fenceline, which served to further spread EMS awareness and reinforce stronger communication channels throughout the organization. Over time the participants believe their auditors will refine the audit approach and subsequently their technique which will make the audit process much more efficient.

Conducting a Management Review

The Management Review is the final element of the EMS cycle. It is an opportunity to make broad decisions about the suitability, adequacy, and effectiveness of the EMS plans and arrangements, about the future of the EMS and, as appropriate, to fine-tune the system and make course corrections. Management determines whether the EMS is functioning properly and delivering benefits that outweigh costs, where responsibilities may need to be shifted, additional

resources may need to be allocated, and if the environmental policy is appropriate or needs to be reviewed.

The management review was viewed by the participants as an opportunity to fully brief and, in some cases, re-engage management on the overall EMS implementation process. For most participants this also provided an opportunity to present performance improvements realized through the first two years of EMS efforts. Most of the participants had fed management information throughout the development and implementation process, which resulted in a focused and productive review process as less time was spent reviewing the EMS process as management was already up to speed. However, the management review was the first time management received a comprehensive set of information providing a big picture view of the EMS. Information reported to management included:

- EMS Audit results
- Compliance assessment results
- Internal suggestions
- External communications
- Progress on objectives and targets
- Performance measures
- Reports of emergencies, spills, other incidents/accidents
- New or modified laws/regulations

To facilitate the process it was emphasized that the information should be distributed in advance of the meeting and presented in a fashion that is easy to understand and adds value to the process (e.g. what does management want to hear?). The frequency at which the meetings are held varies from participant to participant – typically once or twice a year depending upon the organization’s progress and level of involvement desired by management. For example, Kent County managers are intimately involved with day-to-day EMS activities, to the extent of participating in a majority of Core Team meetings.

FINAL WORKSHOP - Washington, DC

April 2005

The final workshop was held in Washington, DC, co-hosted by the U.S. EPA and Resources for the Future. It provided an opportunity for the participants to share their EMS implementation experiences with a wider audience. The participants reported on the benefits associated with their EMS implementation experiences, discussed their motivations for participating in the initiative and what made their efforts successful.

Jim Connaughton, Chairman of the White House Council on Environmental Quality, was the workshop’s keynote speaker. Mr. Connaughton discussed the need to continue the promotion and adoption of EMS in the local government sector and provided specific examples of how the Federal government is “walking the walk” with EMS implementation efforts within various levels of government. He explained, “we have had 32 public entities implementing EMSs within the pilot projects. We should make that 1000! Take the experience and replicate it. See what works and what does not - then copy the positive and apply it to your local needs”. Mr.

Connaughton further reinforced the Federal Government's support and promotion of EMS as a valuable tool and congratulated participants on their continued leadership in this regard.

Participants each received a project completion certificate signed by U.S. EPA and GETF during a formal graduation ceremony.

Appendix C:

Management Roundtable Summary

**THIRD EMS INITIATIVE FOR PUBLIC ENTITIES
MANAGEMENT ROUNDTABLE SUMMARY
January 20, 2004 – Orlando, FL**

Participants:

Harry Gregori, *Director*, P2 and Compliance Assistance Virginia DEQ
Bob Wichser, *Director of Water & Wastewater Operations*, Rivanna Authority
Charley Masco, *Deputy Operations Manager*, Clark County, WA
Pete Capell, *Director of Public Works*, Clark County, WA
Paul Bender, *Manager - Power Production*, Sacramento Municipal Utility District
Lori Cunniff, *Manager*, Orange County Environmental Protection
John Stufflebean, *Director of Environmental Management*, City of Kansas City
Tom Ackert, *Executive Director*, Orange County Convention Center
Jimmy Parrish, *Environmental Protection Specialist*, Defense Supply Center Richmond
Hans Medlarz, *Public Works Director*, Kent County, DE
Jessie Allen, *General Manager*, Orange County Convention Center
Thomas Hadden III, *Executive Director*, Metro Waste Authority
Fred Baker, *Facility Operations Manager*, Orange County Convention Center
Pat Plocek, *Parks Division Manager*, City of Charlottesville

Facilitators:

Jim Horne, *National Program Manager*, U.S. Environmental Protection Agency
Faith Leavitt, *Principal*, Global Environment & Technology Foundation
Nick Martin, *Project Manager*, Global Environment & Technology Foundation

The Management Roundtable was held as a track session on day one of the Third EMS Initiative for Public Entities, phase III Orlando workshop, January 20, 2004. The concept was to bring together representative managers from each of the nine participating organizations to hold an informal discussion based upon the following set of questions, with an accompanying summary of participant remarks:

- 1) What were the key motivating factors (i.e. drivers) that caused you to decide to develop an EMS and participate in the project sponsored by EPA and GETF?
- 2) What were the specific benefits you hoped to realize by developing the EMS when you started? Have these changed in the past year?
- 3) What benefits have you actually seen from going through the EMS process for the past year?
- 4) What has been your role to date in overseeing and helping to ensure the success of your organization's EMS?
- 5) What have been the most pressing challenges you have faced? What advice would you give other managers who are considering developing an EMS?
- 6) What have you as a manager learned over the past year as your staff works to develop the

EMS? In other words, have there been any “a-ha” moments for you?

- 7) Once your EMS is in place, what challenges do you expect to face to keep it robust?
- 8) Would you recommend any changes to the way the training and technical assistance has been provided under this project thus far?
- 9) Is there any specific feedback you would like to give to EPA as we continue to promote EMS adoption by local governments?

Motivating Factors and Drivers for EMS Implementation

“Team members had some background in ISO 9000; however, initially we were all a bit nervous at first, feeling that the new initiative would be complex and highly technical. The team returned from the first workshop with a “fence” to put around the project and the training helped tremendously”.

- Jessie Allen, *General Manager*, Orange County Convention Center

“You can tell when you send people out to “scout” a concept/project whether or not they have bought in to it when they return. The team views themselves as pioneers that all care about the environment and since the convention center culture is one of sharing they have the opportunity to lead and encourage others to follow”.

- Tom Ackert, *Executive Director*, Orange County Convention Center

“Clark County values environmental stewardship and has been successful with a variety of individual initiatives, but has only established limited baselines, measurement approaches, or documentation. The EMS provides a mechanism to accomplish this and build upon what has been established. Public credibility is also very important”.

- Pete Capell, *Director of Public Works*, Clark County, WA

“With our organization located within a university-focused area, we have external stakeholders that are very knowledgeable and interested in the way we do business. Therefore, the City felt strongly that they wanted to step forward and be the environmental leader within the community”.

- Pat Plocek, *Parks Division Manager*, City of Charlottesville

“The Metro Waste Authority has positioned itself as a national leader in waste management and EMS implementation was viewed as a means for our organization to continually raise the bar”.

- Thomas Hadden III, *Executive Director*, Metro Waste Authority

“At Brookhaven Laboratories, the central driver was stakeholders. The EMS provided a means to proactively reach out and educate stakeholders about our environmental efforts”.

- Lori Cunniff, *Manager*, Orange County Environmental Protection

“Resource savings, especially long-term. Landfills are not the most attractive operation, especially when considering site placement. Asset management is the key to our success”.

- Thomas Hadden III, *Executive Director*, Metro Waste Authority

“We are directly accountable to an elected Board and have witnessed increased interest in this program and the environment in general. A new piece of equipment is generally voted on in minutes, whereas environment-related issues can spur discussions lasting some time. The Board is interested in how an EMS can help in accomplishing more with the same investment”.

- Paul Bender, *Manager - Power Production*, Sacramento Municipal Utility District

“We have noticed that potential clients are increasingly concerned about the environment in negotiations and inquiries. We felt the need to be proactive”.

- Jessie Allen, *General Manager*, Orange County Convention Center

Challenges, Barriers, and Lessons Learned

“Initially, internal skeptics of the EMS initiative sat in meetings with their arms folded. As the organization has begun to embrace the changes we are breaking barriers and nearly everyone has unfolded their arms as they see the changes as positive”.

- Thomas Hadden III, *Executive Director*, Metro Waste Authority

“We faced some initial challenges getting over the resistance of “if it is not in my job description, I’m not doing it”. The administration staff was much more accommodating than originally expected and went above and beyond the call of duty to propose several changes”.

- Harry Gregori, *Director, P2 and Compliance Assistance* Virginia DEQ

“Proposed initiatives are inevitably tied to the bottom-line, thus there was a concerted effort to show potential cost savings from investing in EMS implementation. Environmental efforts have not been historically tied to economics”.

- John Stufflebean, *Director of Environmental Management*, City of Kansas City

“There was an initial concern that once the EMS implementation was underway there would be continued requests for more and more personnel and resources”.

- Thomas Hadden III, *Executive Director*, Metro Waste Authority

“Since the EMS encourages a proactive approach to management and public outreach, people will begin to start identifying the convention center with waste generation. We need to be prepared for this and keep the initiative positive”.

- Fred Baker, *Facility Operations Manager*, Orange County Convention Center

“Managers, as well as engineers a lot of times, want to see results immediately. The EMS process is systematic and requires patience. Patience is the key”.

- Charley Masco, *Deputy Operations Manager*, Clark County, WA

“Originally we struggled with implementing the EMS department-wide or within a smaller fenceline. We proceeded to select a fenceline that encompassed only about 10% of our operations and realized that we would not have been successful with a department-wide

approach. We plan to expand department-wide, but will do so in phases to ensure a quality management system”.

- Charley Masco, *Deputy Operations Manager*, Clark County, WA

“Implementing the EMS within the entire Public Works Department would have been impossible. Employee involvement is key, including incorporating their specific ideas as much as possible. However, don’t expect buy-in and change to occur overnight”.

- Pat Plocek, *Parks Division Manager*, City of Charlottesville

“It is very difficult within the utility’s industry to just stay within compliance; therefore, it was a challenge to convince those within the organization the reasoning to move beyond compliance. I would encourage others to look for successes and start with an area that will support the effort”.

- Paul Bender, *Manager - Power Production*, Sacramento Municipal Utility District

“It is important to look for early successes, capture them, and learn how to best share this information. We remained honest with stakeholders about time and resource commitments, but asked that they be patient and that benefits will continue to perk up”.

- Charley Masco, *Deputy Operations Manager*, Clark County, WA

“In hindsight I might have been more patient with our outreach efforts. We developed an outstanding approach (mascot and roll-out) that garnered immediate interest and excitement throughout the organization; however, initial implementation activities involve only a smaller Core Team thus the initiative lagged until the plan was ready to be rolled out”.

- Hans Medlarz, *Public Works Director*, Kent County, DE

“It is critical that management commit personal time, not just staff time and resources. Be there visible, pushing back (challenging), encouraging, and showing active support”.

- Paul Bender, *Manager - Power Production*, Sacramento Municipal Utility District

“City Managers and Officials are currently very supportive of our efforts; however, the challenge will come when we need to propose operational changes and/or upgrades that might evolve from the EMS process that are not currently covered under our initial budget”.

- Pat Plocek, *Parks Division Manager*, City of Charlottesville

Benefits

“It’s all about hospitality in the Convention Center business, we have a responsibility to clean out a hall directly after an event concludes. The EMS will allow the Center to do the right thing and find creative ways to recycle and reuse products that might otherwise go to the landfill”.

- Fred Baker, *Facility Operations Manager*, Orange County Convention Center

“Prior to joining the EMS Initiative project, we thought that we had the most environmentally friendly operation realistically feasible; however, working through the first two phases of EMS implementation we have discovered several areas for improvement”.

- Paul Bender, *Manager - Power Production*, Sacramento Municipal Utility District

“Having gone through the first year of EMS implementation, employees are much more aware of what their jobs mean to the organization’s operations and potential impacts on the environment”.

- Hans Medlarz, *Public Works Director*, Kent County, DE

“Prior to EMS implementation, our operations were not well thought of by the local community. We had endured some difficult public relations issues. Now we proactively share information about our activities with the public and often hear, “why did you not involve us before, we could have provided some useful input”. Although we continue to pay for our past practices, the EMS experience has been a definite step in the right direction. EMS as a communication tool really works”.

- Harry Gregori, *Director, P2 and Compliance Assistance* Virginia DEQ

“We were initially concerned that if we post environmental information on our website that there might be some potentially negative reactions from the public. We have been pleasantly surprised that very few people have expressed concern, if anything people have been comforted to know that we are being proactive”.

- John Stufflebean, *Director of Environmental Management*, City of Kansas City

“One of the nice things about this program and EMS implementation is that it doesn’t try to solve everything immediately with a ‘band-aid’. What is built in is that an organization comes up with a list of issues and addresses them in a logical, systematic way”.

- Paul Bender, *Manager - Power Production*, Sacramento Municipal Utility District

Maintaining Commitment and Enthusiasm

“Make management review useful and informative. Within many organizations the environmental staff simply provides the same type of “spiel” to management year after year. For a successful EMS you need real dialogue and exchange to both encourage and challenge continual improvement”.

- Lori Cunniff, *Manager*, Orange County Environmental Protection

“The younger generation of employees is generally more environmentally-conscious and receptive of an EMS approach. For our Core Team we tried to find a good mix of this generation with those that have solid operational knowledge and experience. This has worked really well”.

- Pat Plocek, *Parks Division Manager*, City of Charlottesville

Appendix D:

Additional Information on an EMS for Local Governments

Additional Information on an EMS for Local Governments

The amount of EMS guidance material available has grown exponentially over the last few years; however, it is widely agreed upon that distinct differences exist between private and public EMS experiences. A key source of EMS information specifically focused on public entities 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 between the Global Environment & Technology Foundation (www.getf.org) and the U.S. EPA EMS Programs (www.epa.gov/ems) and was a direct result of the three EMS Initiatives for Public Entities projects.



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>

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>

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.umn.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