

Final Report:

The US EPA Environmental Management System
Pilot Program for Local Government Entities



Prepared by

Global Environment & Technology Foundation
7010 Little River Turnpike, Suite 300
Annandale, Virginia 22003
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Faith Leavitt, Project Manager and principal author, GETF
Craig Ruberti, GETF
Joanne McKernan, GETF
Kelly Lacher, GETF
Candi Carpenter, GETF
Christine Haymes, GETF
Stephen R. Wassersug, GETF
Jim Horne, US EPA – Office of Wastewater Management, Project Co-Manager
John Dombrowski, US EPA – Office of Compliance, Project Co-Manager

Project Participants

Randy Grant, Chief Environmental Officer
Larry Person, Senior Environmental Coordinator
Dennis Enriquez, Environmental Coordinator
Garen McClure, Environmental Programs Specialist
Scottsdale, Arizona

Ron Fadoir, Environmental Specialist
Ronald Rees, Superintendent
Wayne County, Michigan

Dave Baseheart, Assistant City Manager
Mark Pfefferle, Environmental Specialist
Gaithersburg, Maryland

Mike Toledo, Deputy of Operations
Massachusetts Corrections Institute – Norfolk, Massachusetts

James Smith, Assistant City Manager
Mark Young, Director
Matt Donahue, City Councilman (Former)
Lowell, Massachusetts

Liz Todd, Solid Waste/Recycling Coordinator
Troy Brown, Director of Administrative Services
Peter Lowitt, Town Planner (Former)
Town of Londonderry, New Hampshire

Ajay Singh, Director Internal Controls and Special Projects, CPM
Jim Strycharz, Deputy Director, Internal Controls
Bill Jehle, Chief, Environmental Engineering

Thomas Abdallah, Environmental Engineering
Candace Mertone, Director, Quality Programs
Vijay Verma, Construction Manager

Amy McClure, Project Manager
Kendall Coad, Project Manager
City of Indianapolis, Indiana

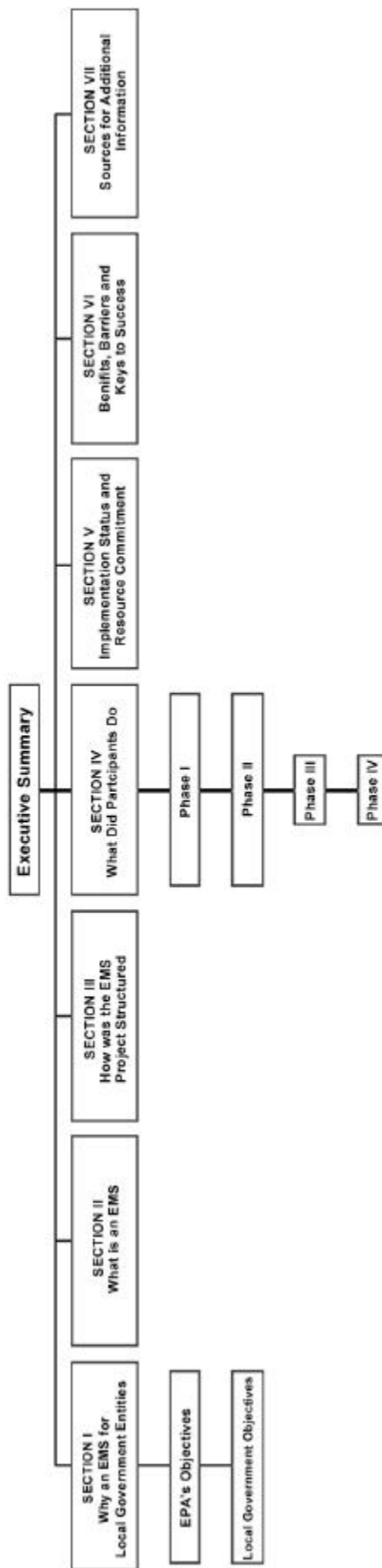
Irene Armock, Environmental Analyst
City of Lansing, Michigan

Table of Contents

Organization of Final Report	iv
Executive Summary	1
Section I Why an EMS Pilot Project for Local Government Entities?....	9
Section II What is an EMS?.....	12
Section III How was the EMS Pilot Project Structured?.....	14
Section IV What did the Participants Do?.....	21
Section V Implementation Status and Resource Commitment.....	48
Section VI Benefits, Barriers and Keys to Success.....	51
Section VII Sources for More EMS Information.....	59
Appendix A Glossary of Terms.....	60
Appendix B Participant Case Studies.....	63
City of Lowell, Massachusetts.....	64
City of Gaithersburg, Maryland.....	69
City Londonderry, New Hampshire.....	75
Massachusetts Corrections Institute – Norfolk, Massachusetts.	79
New York City Transit Authority - New York, New York.....	83
City of Scottsdale, Arizona.....	89
Wayne County, Michigan.....	100
Indianapolis, Indiana.....	106
Lansing, Michigan.....	111
Appendix C Sample Documentation.....	115
Appendix D Completed EMS Requirements.....	123
Appendix E Memorandum of Understanding (MOU).....	125

ORGANIZATION OF THE FINAL REPORT

The report is divided into seven sections as illustrated below. Each section explains the motivating factors that lead EPA and the participants to undertake an Environmental Management System (EMS) pilot project, how implementation activities were structured, issues that participants faced in developing the EMS and examples of their implementation experiences in each phase of activity. Information is available about average resource commitments participants made, benefits and barriers they experienced, and sources of additional information to learn more about EMSs. Appendix B contains individual case study information developed by each participant.



EXECUTIVE SUMMARY

For the last several years the US Environmental Protection Agency (EPA) has been evaluating new initiatives to help organizations address environmental problems “that have yet to be solved through the current system.”¹ These initiatives include an emphasis on streamlining the regulatory process and introducing innovative programs for managing environmental issues more effectively. Environmental Management Systems (EMSs) are important new tools to encourage organizations to improve compliance, pollution prevention, and environmental performance and to promote greater environmental stewardship throughout the workforce.

What is an EMS?

An EMS is a set of problem identification and problem-solving tools that can be implemented by the employees in an organization in many different ways, depending on the organization’s activities and needs. EMSs follow Shewart and Deming’s well-known Quality Management approach of “*plan, do, check, and 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 and measure and evaluate their progress in environmental performance both in areas that are regulated and areas that are not (e.g., demand-side issues such as water or electricity use). The EMS integrates the environment into everyday business operations, and environmental stewardship becomes part of the daily responsibility for employees across the entire organization, not just in the environmental department.

Why did EPA Sponsor the Initiative?

From August 1997 through July 1999, EPA sponsored an EMS pilot program to test the applicability and benefit of an EMS on environmental performance, compliance, pollution prevention and stakeholder involvement in local government operations. The project reflects the growing awareness and support within EPA for voluntary adoption of EMSs.

Who Provided Technical Assistance and Training?

EPA selected the Global Environment & Technology Foundation (GETF) to lead the initiative. GETF conducted the candidate screening, provided training, coaching, and

¹ EPA Innovations Task Force, *Aiming for Excellence, Actions to Encourage Stewardship and Accelerate Environmental Progress*, EPA 100-R-99-006, July 1999, p. 3.

technical assistance to each participant, developed implementation materials and toolkits, and collected data and information about the benefits, barriers, and keys to success throughout the two-year program. EPA did not provide direct financial assistance to participating organizations and did not offer any regulatory flexibility.

Who were the Project Participants?

Nine local government entities were selected from a field of applicant. Each participant selected a department, division, or operation to which they would apply their EMS. This entity was called their “fenceline.”

Participants in the initiative included:

Local Government Entity	“Fenceline”	# of Employees
Town of Londonderry, New Hampshire	Department of Public Works	15
City of Lowell, Massachusetts	Wastewater Treatment Facility	46
Wayne County, Michigan	Wastewater Treatment Facility	100
City of Indianapolis, Indiana	Department of Public Works	150
Massachusetts Department of Corrections - Norfolk	State Prison Facility: Power Plant, Wastewater Treatment & Industries	31
City of Gaithersburg, Maryland	Department of Public Works	80
Lansing Board of Water & Light, Michigan	Electric Generating Facility	35
New York City Transit Authority	Capital Programs Management	1,700
City of Scottsdale, Arizona	Department of Water Resources Department of Financial Services	1,500

Why were Municipalities Interested in an EMS?

A number of factors motivated municipal organizations to apply for participation in the EMS initiative, including but not limited to:

- ❑ **Compliance responsibilities:** concerns for potential; environmental problems, incidents and enforcement actions.
- ❑ **Management confidence:** management wanted assurance that their organization was adequately handling its environmental responsibilities and identifying opportunities for improvement.
- ❑ **Organizational factors:** better efficiency, worker health and safety concerns, employee morale, and reduced costs.
- ❑ **Public image concerns:** improving poor relationships with neighbors and counteracting bad press.

- ❑ **Improved regulatory relationships:** “Every time EPA shows up it’s a compliance issue or a consent decree.”
- ❑ **Privatization issues:** remaining competitive with private industry or privatized operations.
- ❑ **Growth management:** address smart growth and sprawl issues, consider using EMS as an incentive to attract the right type of industry and send a message that the city has a strong environmental consciousness.
- ❑ **Municipalities as leaders and innovators:** several participants wanted to play a strong role in leading and mentoring their communities in environmental stewardship initiatives.

What are the Key Characteristics of an EMS?

Participants were asked to complete seventeen key elements in their EMSs.

EMS ELEMENTS	
1. Environmental Policy	10. Document Control
2. Environmental Aspects	11. Operational Control
3. Legal and Other Requirements	12. Emergency Preparedness and Response
4. Objectives & Targets	13. Monitoring and Measurement
5. Environmental Management Programs	14. Nonconformance & Corrective and Preventative Action
6. Structure and Responsibility	15. Records
7. Training: Awareness & Competence	16. EMS Audit
8. Communication	17. Management Review
9. EMS Documentation	

These are based on the *International Standard ISO 14001, Environmental Management Systems – Specification with guidance for use.*

What Implementation Strategy was Developed?

GETF and EPA developed a four-phased EMS implementation program to help each local government entity develop and implement an EMS at the fenceline of their choice. Each phase focused employees on completing a number of EMS requirements. Intensive 2 ½ day workshops were scheduled at the beginning of each new phase of activity to prepare participants to train and lead their EMS Implementation Teams through successful completion of the EMS requirements in each implementation phase.

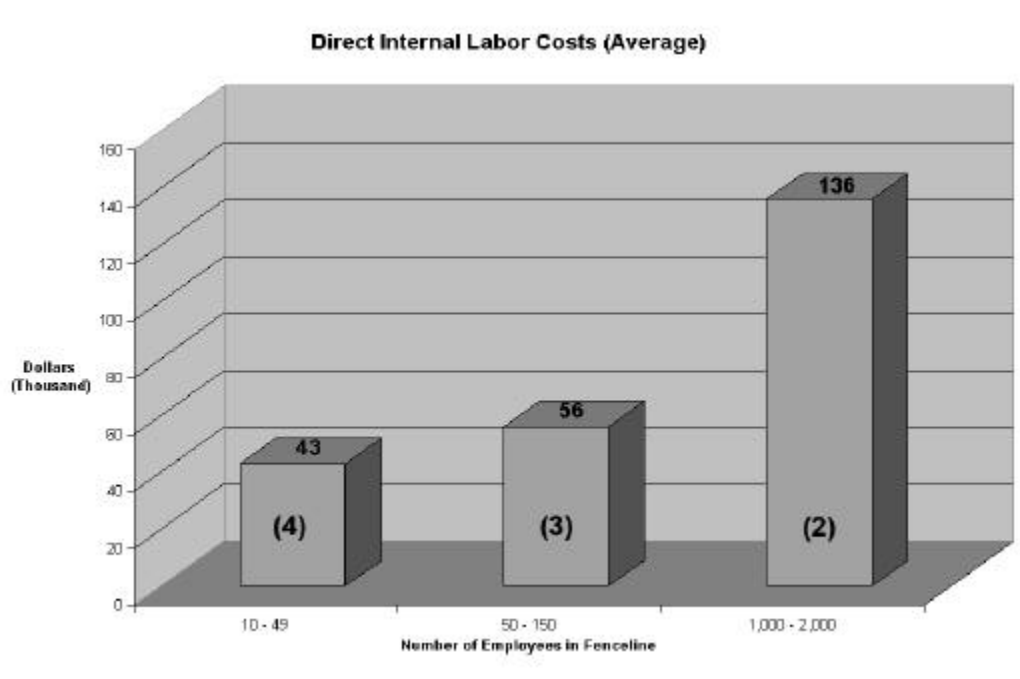
PHASE I	PHASE II	PHASE III	PHASE IV
August 1997- January 1998	February 1998- June 1998	July 1998- January 1999	February 1999- July 1999
• Establishing the Program	• Developing the Environmental	• Establishing Objectives and	• Checking and Corrective

<p>Infrastructure inside the Organization</p>	<p>Policy;</p> <ul style="list-style-type: none"> • Determining legal and other requirements • Determining significant aspects 	<p>Targets</p> <ul style="list-style-type: none"> • Designing Environmental Management Programs 	<p>Action;</p> <ul style="list-style-type: none"> • Management Review
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What was the Average Resource Commitment?

Throughout the life of the project, participants tracked monthly expenses associated with their EMS activities throughout each of the four phases of implementation. The direct internal labor costs accounted for the bulk of the financial resources participants invested. Other costs include travel to training sessions, in-kind contributions, and materials. Figure 1 illustrates the direct internal labor costs (average) incurred for implementing the EMS over a 21-month period (The expenses of each participant are examined in Appendix B - Case Studies).

Figure 1

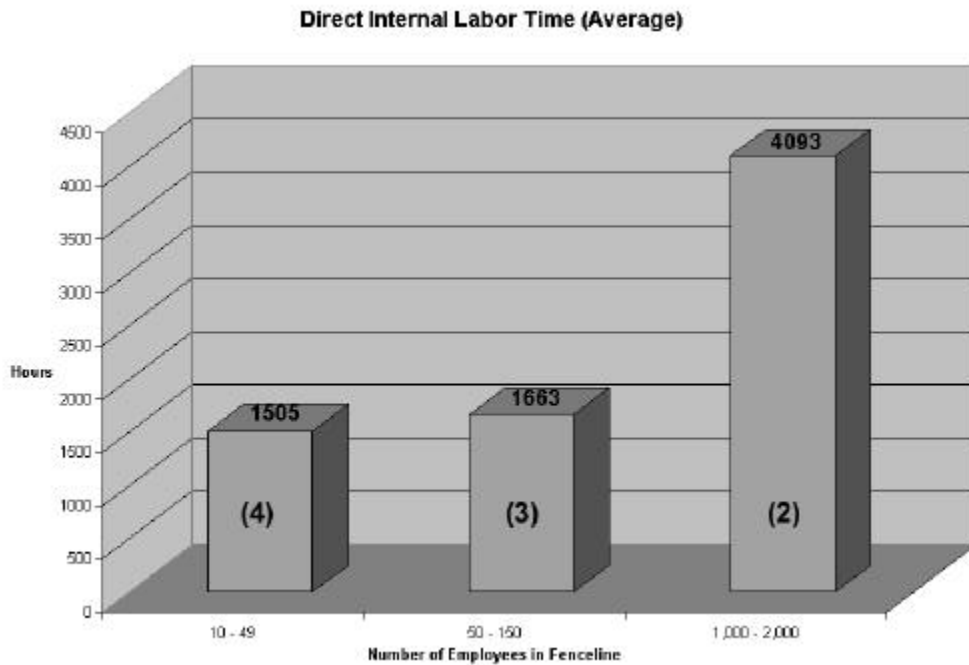


The number in parentheses indicates the number of participants in that size category.

In addition to the EMS Management Representative and the Implementation Team, city government personnel, community activists, administrative support staff, legal departments, and environmental managers contributed time to the EMS program. Figure

2 illustrates the total direct internal labor time (average) committed to implement the EMS over a 21-month period.

Figure 2



Four of the nine participants sought outside services to support their employee efforts. Consultants addressed specific individual needs ranging from training, to documentation, to assistance developing policies, procedures, and work instructions. Resource commitments for these outside services are reflected below in Table 1:

Table 1

Organization	Consultant Time	Consultant Costs
Wayne County	80 hours	\$2,400
Indianapolis	102 hours	\$9,700
Lowell	210 hours	\$10,500
New York City Transit Authority	1,110 hours	\$143,000

As can be seen from Table 1, one of the participants, the New York City Transit Authority, chose to rely heavily on consultants to develop their EMS. While this is certainly an acceptable approach for any organization, it is not, in most cases, necessary to rely heavily on consultants to develop an effective EMS.

What were the Benefits?

1. A positive effect on environmental compliance and performance

“With regard to environmental compliance, we have a better understanding of our legal requirements. We have better-trained employees whose competence in their work area is critical to the environment. We expect that our EMS efforts will increase our ability to stay in compliance.”

2. Improved environmental awareness, involvement and competency throughout the organization

“There’s a much better understanding of environmental issues in every department of the fenceline, not just in the environmental department. We are recognizing simple internal “housekeeping” measures that are having a positive effect on our environmental performance. We have self-imposed additional requirements to help prevent pollution, reduce energy use, manage our contractor, and expand environmental education for our citizens. Employees are bringing ideas for reducing our waste streams and suggesting the procurement of less toxic products. There has been a definite improvement in involvement and morale!”

3. Better communication about environmental issues inside and outside the organization

“We know much more about our environmental issues than we did 18 months ago. Consequently we are more articulate in our conversations with other departments, other bureaucratic systems, with the state, with our own regulators, and with our neighbors.”

4. Improved efficiency, reduced costs, greater consistency

“In a relatively short period of time we have learned and implemented efficient management tools for defining our environmental priorities and responsibilities. We have developed performance partnerships with our city organizations. We can better prioritize and defend our resource needs. The EMS tools give us a better understanding of what we are required to do and the means to do it consistently, competently, and efficiently.”

5. Better relationships with regulator

“The pilot project has provided an opportunity to reshape our interactions with our regulators. Our past dealings with EPA had a confrontational quality. The pilot project allowed the agency to take on a new role as mentor and partner. This was one of the more valuable outcomes of the project.”

What were the Barriers?

1. Managing organizational change

“As we develop programs that build environmental stewardship and improve how we manage our environmental obligations, we must also develop programs that manage human and organizational resistance to change.”

2. Lack of top management visibility and involvement

“Change management requires top management leadership and visibility and personal involvement, not just lip service. Management needs a better grasp/understanding of what an EMS requires of an organization and of their role in the process before deciding to implement it.”

3. Organizational issues

“Time, Time, Time! Time is an essential resource ...it’s very limited and there is an erroneous perception that the EMS is above and beyond normal work duties. Dollars are abstract – but time is concrete and while management has assured us the necessary dollars they allow too little staff time. Getting first tier management buy-in and cross-functional responsibility for EMS implementation has been a challenge. EMS implementation is viewed as the Implementation Team’s project.

4. Lack of public awareness, understanding and buy-in

“There’s a lack of awareness or understanding about the benefits that the EMS has brought to the organization and the value it will bring in the future. Local government entities can realize many more benefits than just being in compliance, and we’ve broadened the performance indicators we are using to measure our success. We haven’t communicated this fact well to the city management or to the public, so there’s little demand from our clients – the citizens – for the EMS.”

5. Political uncertainty

“The EMS is not institutionalized yet. We have a new administration in the wings. We hope the EMS won’t be seen as the last regime’s program.”

What are the Keys to Success?

Participants agreed on four pivotal issues among the many lessons that they learned:

- 1. Top Management commitment and support is essential to the success of the EMS process.**
- 2. Organizations who build on existing organizational processes and procedures are more successful than those who create new EMS elements.**
- 3. The Implementation Team is pivotal to the success of the EMS program.**
- 4. Employee awareness, understanding and involvement in the EMS should extend across the entire organization and be recognized as an organizational priority.**

Data and information collected in the project suggests that EMSs are entirely applicable to operations managed by local governments. Without exception, participants found the EMS to be a useful tool for managing environmental issues, promoting compliance and

pollution prevention approaches, increasing environmental awareness and stewardship, and improving operational efficiency and control.

Based on these project results, and the Agency's continuing interest in promoting and encouraging the use of EMSs in local government entities, EPA decided to conduct a second EMS Pilot Project for local government entities starting in early 2000. GETF will once again lead the second round of participants in their efforts to develop and implement an EMS. The information below is based on the findings and experiences of the nine participants from the first local government EMS implementation project.

SECTION 1: Why an EMS Pilot Project for Local Government Entities?

In May 1997, the US Environmental Protection Agency's Office of Wastewater Management and Office of Compliance launched a unique pilot program to test the value of an EMS for improving environmental performance and compliance in local government entities.

Nine local government entities participated in the two-year initiative. Each developed and implemented an EMS (using the ISO 14001 International standard as a starting point) in a facility or operation of their choosing which is called their "fenceline".

Participants included:

Local Government Entity	"Fenceline"	# of Employees
Town of Londonderry, New Hampshire	Department of Public Works	15
City of Lowell, Massachusetts	Wastewater Treatment Facility	46
Wayne County, Michigan	Wastewater Treatment Facility	100
City of Indianapolis, Indiana	Department of Public Works	150
Massachusetts Department of Corrections - Norfolk	State Prison Facility: Power Plant, Wastewater Treatment & Industries	31
City of Gaithersburg, Maryland	Department of Public Works	80
Lansing Board of Water & Light, Michigan	Electric Generating Facility	35
New York City Transit Authority	Capital Programs Management	1,700
City of Scottsdale, Arizona	Department of Water Resources Department of Financial Services	1,500

Additional information about each participant can be found in Appendix B.

US EPA Objectives for the EMS Pilot Program

US EPA wanted to determine if the EMS approach for managing environmental activities was relevant to local government organizations and could provide the basis for a positive effect on environmental performance, compliance, pollution prevention and stakeholder involvement in local government operations. Implementation of voluntary EMSs to date focused primarily on private sector organizations, but it was becoming increasingly clear that they might provide significant benefits to the public sector.

Jim Horne, Assistant to the Director of the US EPA Office of Wastewater, remarked,

"We recognize that public sector organizations are faced with the same resource shortages as the private sector. We want some useful information to share with other organizations as to how Environmental Management System implementation affects their overall operations. The project is designed to integrate and promote the use of Environmental Management Systems at the local level. We are looking for this project to provide the community and us with solid information on the experiences of these organizations developing and implementing an EMS."

John Dombrowski, the US EPA's Office of Compliance, added,

"We want to determine if the EMS approach for managing environmental activities can have a positive effect on environmental performance, compliance, and pollution prevention in local government operations."

EPA believes EMSs, if implemented properly, are valuable tools to help organizations improve their environmental performance, increase the use of pollution prevention activities, and improve compliance. Action 2 of the report *Aiming for Excellence-Actions to Encourage Stewardship and Accelerate Environmental Progress* published in July 1999, states that "as a matter of policy, EPA will promote and encourage the use of Environmental Management Systems that help improve compliance, pollution prevention, and other measures of environmental performance²."

The EMS Pilot Project for Local Government Entities project reflects the growing awareness and support within EPA for voluntary adoption of EMSs. As a result of the agency's position on promoting EMSs and also as a result of the success of the first EMS initiative for local government entities, EPA announced its intention to sponsor a second EMS pilot initiative in the local government sector beginning in early 2000. EPA will continue to evaluate which EMS elements and applications are most effective and determine how these systems might be used to strengthen environmental programs and policies.

Local Government Objectives for the EMS Pilot Program

Counties, municipalities, towns, and townships typically oversee a number of separate facilities and operations. They are expected to satisfy a broad spectrum of citizens' environmental, operational, financial, legal, and social needs. Privatization is challenging aging municipal infrastructures to offer citizens cheaper, better, faster, and often greener services. State and Federal regulatory agencies are increasing compliance and enforcement scrutiny of municipal facilities in programs like the State of Massachusetts' Clean States Initiative. Many public sector entities, which ideally should be role models for their communities, are unprepared to address the complex environmental challenges that are confronting them. These realities make an EMS decidedly applicable to local government entities.

² EPA Innovations Task Force, *Aiming for Excellence, Actions to Encourage Stewardship and Accelerate Environmental Progress*, EPA 100-R-99-006, July 1999, pp. 11-14.

An EMS is a powerful tool for addressing the large-scale problems of operating and maintaining physical plants, power and water systems, and complex roadway systems. An EMS can often provide municipal governments with opportunities to serve as environmental mentors for their communities since they both regulate and are regulated. Entities who implement and maintain an EMS have a firsthand ability to share benefits, barriers, and lessons learned with their public and private sector colleagues. Consequently there is a broader understanding of disparate stakeholder concerns, a common language to discuss environmental issues, and an increase in non-adversarial performance partnerships between the regulator and the regulated communities.

A number of motivating factors led organizations to apply for participation in the EMS pilot project:

- ❑ Compliance responsibilities: concerns for potential; environmental problems, incidents and enforcement actions.
- ❑ Management confidence: management wanted assurance that their organization was adequately handling its environmental responsibilities and identifying opportunities for improvement.
- ❑ Organizational factors: better efficiency, worker health and safety concerns, employee morale, and reduced costs.
- ❑ Public image concerns: improving poor relationships with neighbors and counteracting bad press.
- ❑ Improving regulatory relationships: “Every time EPA shows up it’s a compliance issue or a consent decree.”
- ❑ EPA’s sponsorship of the project: this was a primary motivator because the public entity could play a role in impacting national policy.
- ❑ Privatization: remaining competitive with private industry or privatized operations
- ❑ Growth issues: address smart growth and sprawl issues, consider using EMS as an incentive to attract the right type of industry and send a message that the city has a strong environmental consciousness.
- ❑ Responsible economic development: some are considering Eco-Industrial Parks and requiring potential tenants to develop EMSs as a prerequisite to moving in.
- ❑ Risk avoidance and risk reduction approaches: to *prevent* non-compliance instead of responding *reactively* to compliance issues (“create our future instead of predict it”).
- ❑ Reducing cost of remediation: some participants host Superfund sites; participants realized that it would be cheaper to prevent pollution than to clean it up after the fact and wanted the EMS to help them initiate stronger proactive programs.
- ❑ Leadership potential in cutting edge programs: several wanted to play a strong role in leading and mentoring their communities in environmental stewardship initiatives.

SECTION II: What is an EMS?

An EMS is a set of problem identification and problem-solving tools that can be implemented in an organization in many different ways, depending on the organization's activities and needs. EMSs follow Shewart and Deming's well-known Quality Management approach of "*plan, do, check, and 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 and measure and evaluate their progress in environmental performance both in areas that are regulated and areas that are not (e.g., demand-side issues such as water or electricity use). The EMS integrates the environment into everyday business operations, and environmental stewardship becomes part of the daily responsibility for employees across the entire organization, not just in the environmental department.

EMSs are a part of the organization's overall management system. They 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.

An EMS engages an organization in:

- ❑ Understanding how their operations and activities impact the environment.
- ❑ Evaluating the extent of risk posed by their environmental issues.
- ❑ Defining an environmental policy that guides the organization's approach and commitments to environmental management.
- ❑ Establishing measurable objectives and targets for environmental performance.
- ❑ Allocating necessary resources to achieve the objective(s).
- ❑ Establishing and maintaining specific procedures to ensure that work activities minimize or eliminate a negative impact to the environment.
- ❑ Communicating responsibilities and work instructions throughout the organization and training employees to effectively carry out their obligations.
- ❑ Monitoring and measuring performance against established standards and indicators.
- ❑ Revising and improving the system based on the monitoring results.
- ❑ Communicating with people inside and outside the organization about the organization's progress.

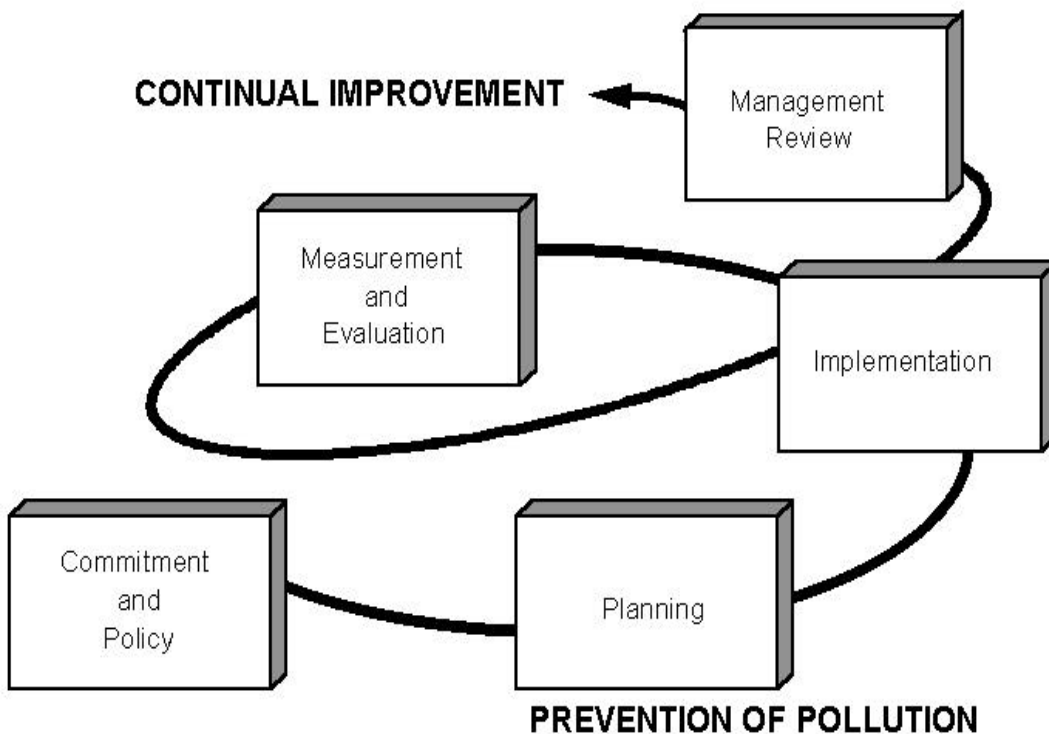
An EMS is not intended to be a substitute for regulatory requirements nor does it offer regulatory relief from the law. EMSs can improve an organization's compliance, pollution prevention and overall environmental performance and hopefully build greater confidence with local stakeholders. EMSs are proactive programs that identify and

address the root causes of potential compliance problem areas. They use pollution prevention approaches. 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.

EPA defines an EMS as a "framework" that helps an organization achieve its environmental goals through consistent control of its operations. The assumption is that this increased control will improve the environmental performance of the organization. The EMS itself does not dictate a level of environmental performance that must be achieved; each organization's EMS is tailored to its individual activities and goals.

An EMS encourages a company to continuously improve its environmental performance. The system follows a repeating cycle.

Environmental Management Systems



“The most commonly used framework for an EMS is the one developed by the International Organization for Standardization (ISO) for the ISO 14001 standard. Established in 1996, this framework is the official international standard for an EMS.”³

³ EPA's Internet site <http://www.epa.gov/opptintr/dfe/tools/ems/bulletins/bullet01/whatems.html>

SECTION III: How was the EMS Pilot Project Structured?

EPA selected the Global Environment & Technology Foundation (GETF) to manage the project. GETF, a 501-[c] [3] not-for-profit organization, provides EMS training and technical assistance to numerous public and private sector organizations across the United States, including similar implementation pilots for other Federal agencies and international organizations. GETF conducted the candidate screening, provided training, coaching, and technical assistance to each participant, developed implementation materials and toolkits, and collected data and information about the benefits, barriers, and keys to success throughout the two-year program.

EPA did not provide direct financial assistance to participating organizations and did not offer any regulatory flexibility. The project was “registration-blind” – that is, there was no expectation for participating organizations to have a third party verify that their EMS contained all the characteristic elements contained in the ISO 14001 standard. EPA anticipated that participants would complete the requirements of the EMS in the “fenceline” of their choice by the time the pilot program ended in July 1999, but realized that some organizations might need more time beyond the project to fully implement the EMS.

Candidate Selection

GETF and EPA created a recruitment process, publicized their intention to recruit candidates, and established selection criteria and scoring procedures. The project announcement in May 1997 attracted interest from municipalities across the United States. Candidates submitted a letter of application signed by top managers from the local government entity and from the facility to which the EMS would be applied. These letters outlined a brief description of the organization and its responsibilities; a preliminary indication of the operations within the organization that would be developing the EMS; a description of the reasons why the organization wished to participate; and, some of the benefits it anticipated receiving from the adoption of the EMS.

Over a three-month period, GETF staff evaluated a variety of data and information and conducted screening interviews by phone with each candidate. Screening topics included:

- Commitment of sufficient resources (staffing and financial) available for the project.
- Potential for successful completion (including top management commitment and other layers of support available to complete the project).
- Understanding the principles of Environmental Management Systems and the scope of the activity.
- Anticipated environmental benefit.

- Willingness to collect and share baseline data and report progress in implementing their EMSs.
- Consultation with EPA Regions.

Using a consistent protocol of evaluation criteria and numerical scoring strategy, GETF and EPA chose nine participants in a competitive, blind selection process.

After selection, top managers from each local government entity signed a Memorandum of Understanding (MOU) with GETF accepting the roles and responsibilities of each of the parties and restating their commitment to provide sufficient resources to complete the requirements of the EMS in the two-year period. A sample of the MOU is included in Appendix E.

Within the first six months, one of the local government entities asked to withdraw from the project because of personnel issues. Both members of the Implementation Team had to withdraw from the project. Top management was not fully committed to the program and did not appoint additional staff. EPA decided to re-compete the vacancy using the same process described above, and an alternate ninth participant was selected. Additional information about each participant can be found in Appendix B.

Developing the Program Structure

GETF worked closely with EPA to develop a program that provided sufficient structure to shepherd the group through the EMS requirements yet was flexible enough to satisfy individual participant needs. Several key program elements included:

- ❑ An implementation strategy that divided EMS requirements into four sequenced phases, each with discrete measurable milestones.
- ❑ Intensive “train-the trainer” workshops involving all participants were scheduled at the beginning of each implementation phase. The “just-in-time” approach to training sessions (worksessions covering just the milestones in the current phase) provided participants with sufficient knowledge, understanding, and materials to build expertise, understanding and experience and lead their individual implementation teams in completing the EMS requirements.
- ❑ EMS training materials, models and templates were specifically tailored for each workshop. Leading experts in the field assisted with instruction and discussion as did other local government entities engaged in EMS activities.
- ❑ Frequent, regular, and consistent communication among project participants and with external stakeholders was an important component of the project structure. Between workshops, weekly email communication, monthly all-hands conference calls, a password protected Intranet Website, written and electronic toolkits, and individual phone consultations maintained on-going technical assistance and coaching. GETF

and EPA personnel made periodic on-site visits throughout the project, to assist implementation teams with training, auditing, technical assistance, procedure writing and change management issues.

- ❑ Team building activities to develop synergy and a strong support network among the participants were built into every workshop. Participants realized early in the project that together they formed an excellent knowledge and problem-solving base.
- ❑ Information and data tracking protocols were developed so that organizations could collect and share common sets of data related to the establishment and implementation of their EMS.
- ❑ A password protected Intranet Website was developed to assist in communication, data sharing and data collection. A requirement for participation in the project was that the EMS Implementation Team had easy access to the Internet.
- ❑ Baseline environmental data about existing EMSs, environmental performance, compliance, stakeholder involvement, and pollution prevention activities was collected using a series of “baseline protocols” (developed by the University of North Carolina (UNC) and the Environmental Law Institute (ELI) and also used in a parallel project with ten state EMS pilot programs). The data will be collated and stored in a national database managed by UNC at Chapel Hill.
- ❑ It was decided that EPA would not review individual environmental data provided by participants. Data would be collected by GETF, aggregated by the neutral third party and added to a national EMS database.
- ❑ Each phase of implementation would span a defined time period; however, it was accepted that participants would move through the milestones in each phase at somewhat varying rates depending on the barriers each encountered in their organizations.
- ❑ While some healthy competition among participants was inevitable, it was emphasized that participants were not involved in an “EMS horserace.” In fact, a mentoring mentality developed rather quickly among the nine participants in the program. Rather than delineating a winner, the synergy of the group helped to move each member more steadily toward achieving their individual objectives.
- ❑ Throughout the project GETF provided EPA with monthly and quarterly reports about the conduct of the program.

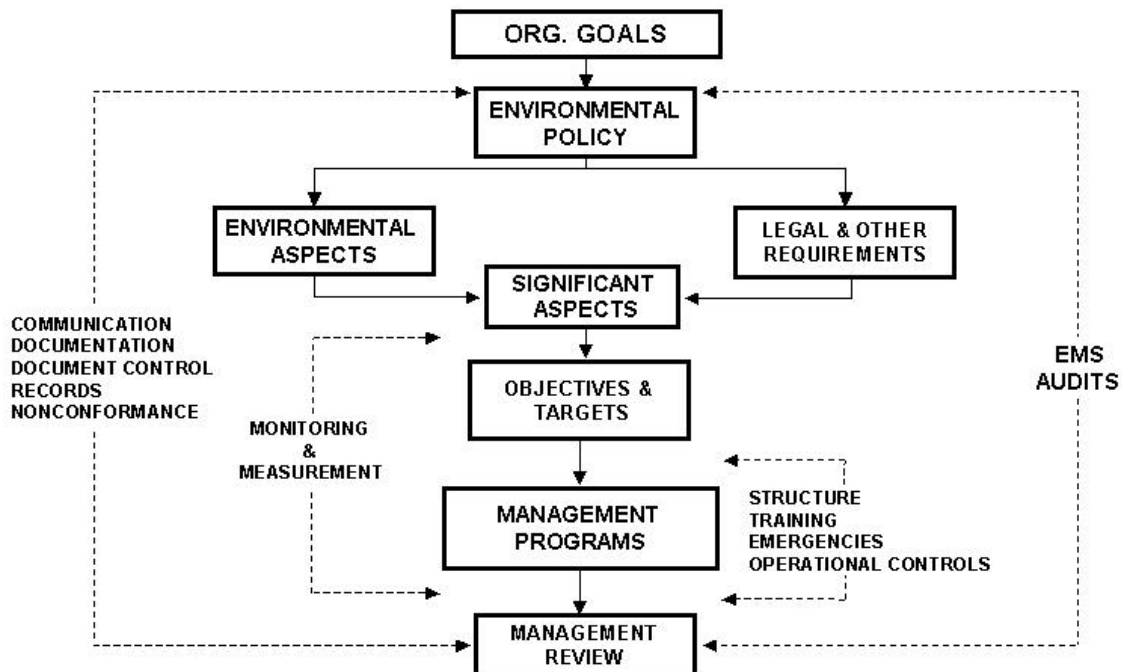
The EMS Requirements

International Standard ISO 14001, Environmental Management Systems – Specification with guidance for use, served as the baseline for the EMS requirements used in the pilot project. This document specifies the seventeen elements participants would complete to implement their conformant EMSs.

EMS ELEMENTS	
1. Environmental Policy	10. Document Control
2. Environmental Aspects	11. Operational Control
3. Legal and Other Requirements	12. Emergency Preparedness and Response
4. Objectives & Targets	13. Monitoring and Measurement
5. Environmental Management Programs	14. Nonconformance & Corrective and Preventative Action
6. Structure and Responsibility	15. Records
7. Training: Awareness & Competence	16. EMS Audit
8. Communication	17. Management Review
9. EMS Documentation	

The EMS elements are linked as follows:

EMS Framework



Training Sessions and Workshops

Four intensive 2 ½ day workshops were scheduled, one at the beginning of each new phase of activity.

PHASE I	PHASE II	PHASE III	PHASE IV	CLOSING MEETING
August 1997- January 1998	February 1998- June 1998	July 1998- January 1999	February 1999- July 1999	July, 1999
Training - August 1997 Boston, Mass.	Training – January 1998 Scottsdale, AZ	Training – June 1998 Lowell, Mass.	Training - January 1999 Ft. Myers, Fla.	New York City, New York

The goal of these sessions was to prepare participants to train and lead their EMS Implementation Teams through completion of the EMS requirements. The structure of each workshop was essentially the same for the first four meetings:

- ❑ An overview of the EMS requirements (based on the ISO 14001 standard) that were to be accomplished in the phase.
- ❑ Review of how these requirements were linked to the system.
- ❑ Overview of records and documents that would be generated in this phase.
- ❑ “Train the trainer” sessions to provide an in-depth coverage of the ISO 14001 EMS requirements and prepare participants to teach their Implementation Teams.
- ❑ Role-playing exercises. Breakout groups became the EMS "core teams" of hypothetical case study facilities. Teams developed environmental policies; flowcharted “fenceline” operations; identified significant aspects and impacts; identified roles, responsibilities and authorities; evaluated training needs; developed system procedures; audited documents. Using case study activities, they confronted all the tasks they would encounter in each of the phases.
- ❑ Guest speakers to provide additional training and discussion.
- ❑ A “Swap Meet” where participants could “show and tell” their EMS accomplishments.
- ❑ Review of tracking sheets and data collection protocols.
- ❑ Guidance, usually in the form of an Action Item List for completing tasks in each phase.
- ❑ Individual trouble-shooting sessions.
- ❑ Logistics planning for the next meeting.

A portion of each meeting, usually on the first day, provided an opportunity for other interested parties from nearby local government entities, regulatory agencies, industries, citizen groups to listen to the discussions and issues and to take the information back to their own organizations. Trade journalists who attended the meetings wrote articles about the program.

The fifth and closing meeting in July 1999 in New York provided a public forum for discussing project results and publicly recognizing each of the participants by EPA and GETF.⁴

Tracking the Project

Throughout the project GETF used monthly tracking sheets and conference calls to collect information about benefits, barriers, and keys to success in the implementation process. Participants discovered that to build support for the EMS across the organization, and particularly with management, it was very important to publicize the benefits that the EMS was providing to the organization. Regular documentation of this information provided material to present to top management in monthly briefings. Many participants started with a small fenceline and planned to expand the EMS to other departments and facilities over time. Consequently it was critical to document strategies for dealing with organizational barriers, lessons learned, and keys to success, and historical information about the implementation strategy for use in future departments and facilities. This information also provided management with information for the management review process. In this report a “Lessons Learned” section highlights some of these issues relevant to each phase of implementation activity. Additionally, a “Keys to Success” section in Section VI presents participants’ views on the factors that were most vital to their EMS implementation efforts.

Next Steps

EPA intends to maintain informal contact with project participants to keep abreast of the status of their EMS and to learn more about the affect the EMS has on the organization as the systems matures. Areas of continuing interest include:

- ❑ environmental performance
- ❑ compliance
- ❑ pollution prevention
- ❑ stakeholder involvement
- ❑ changes in the EMS design
- ❑ opportunities to mentor national and international local government agencies

Throughout the project and even more after the project has been completed participants have been called upon to present papers and case study reports at national meetings across the United States. The benefits participants described have led many other local government entities to consider the value of EMS in managing their own environmental issues. As an example, the Massachusetts Department of Corrections has recently called for three volunteers among its correction facilities to implement an EMS applying lessons learned from the prison fenceline in the pilot initiative. The City of Lowell has been

⁴ This meeting was videotaped and is publicly available by contacting the New York City Transit Authority EMS Management Representative (See Appendix for contact information).

asked to assist a major textile manufacturer in their city with EMS implementation. The City of Gaithersburg has been contacted by another Maryland municipality with a request for technical assistance and mentoring in their EMS efforts.

Many of the participants have volunteered their time to mentor other local government entities engaged in EMS activities. Recently a US Agency for International Development (AID) training course brought twenty municipal managers from countries in transition to the United States to learn about the application of Environmental Management Systems. Part of the curriculum included site visits and worksessions at four cities in the US EPA pilot project and the opportunity to dialogue with US municipal colleagues about EMS application, documentation, benefits, barriers, and keys to success. Pilot participants will also assist in training and technical assistance in the second US EPA EMS Pilot Project for Local Government Entities which will begin early in 2000.

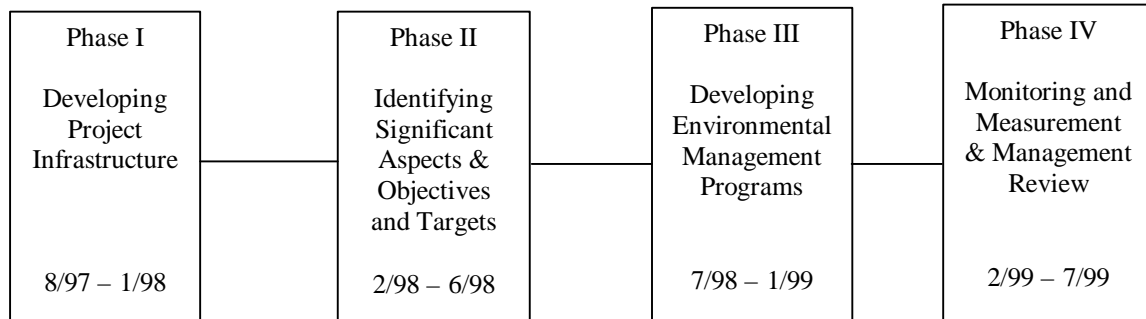
In their own organizations, Implementation Teams are expanding the scope of their EMS to additional departments and facilities. One of the organizations has received third party verification that its system is conformant with benchmarked EMS requirements and four others plan to seek external (third party) verification of the EMS conformance. Lowell, Massachusetts has interviewed five third-party certifiers and expects to schedule an EMS certification audit of its Wastewater Treatment Plant in February or March 2000. The Town of Londonderry, NH will seek third party verification as soon as the budget can accommodate the cost. Gaithersburg, Maryland is scheduling certification activities for late 2000. Wayne County, Michigan is seeking outside consulting services to continue its EMS efforts leading to certification. Other participants have not decided whether to seek third-party verification or self-certification that their systems are EMS conformant. Most reported that they are expanding the scope of their EMS to additional departments and facilities beyond their initial fenceline. All have expressed an interest in mentoring other local government entities interested in implementing an EMS in their operations.

Whether participants choose to certify their EMS or not, they all acknowledge that they will use EMS tools (e.g., competency training, documentation, monitoring, communication, operational control) to help them manage their compliance issues.

SECTION IV: What did the Participants Do?

Participants used a four-phased implementation schedule to develop and implement the EMS in their fencelines.

THE FOUR PHASED IMPLEMENTATION PLAN



“Just-in-time” training and materials were provided in a workshop at the beginning of each implementation phase to prepare Implementation Teams to lead their organizations in the completion of tasks.

Phase I: Developing Project Infrastructure August 1997-January 1998

Tasks in Phase I included:

- ❑ Selecting a project scope (“fenceline”).
- ❑ Establishing an EMS program infrastructure: allocate resources, appoint a Management Representative (project manager) and select an Implementation Team to lead the EMS effort.
- ❑ Evaluating their state of compliance with local, state, and federal environmental laws and regulations.
- ❑ Conducting a gap analysis to determine what EMS processes and procedures the organization already had in place and what needed to be created.
- ❑ Defining the implementation team’s roles, responsibilities and authorities
- ❑ Confirming top management understanding and commitment.
- ❑ Drafting and communicating an environmental policy.
- ❑ Determining a procedure for understanding and communicating legal and other requirements.
- ❑ Planning an EMS “kickoff” for familiarizing employees across the organization with the EMS concept and getting employee buy-in.

ISSUES IN PHASE I

A Steep Learning Curve

While most participants were quite familiar with command and control approaches to environmental management, only one or two had experience with other process management or quality management systems like the ISO 9000 Quality Management Standard. Three of the participants who attended the first training session had been involved in their organization's decision to apply to the program and in the application process. The rest were not fully briefed about EMS or the pilot program goals and objectives. Consequently there was a tremendous "ramp up" of learning involved in understanding the EMS requirements and the process management approach.

Participants have suggested that on-site training with EMS experts at each location at the very beginning of the project would have been a more efficient and effective way to jump-start the EMS program. This recommendation will be incorporated into the planning of the second US EPA EMS initiative. Three-day site visits including separate sessions with the Implementation Team, with top management, and with selected employees will establish a solid basis of understanding about the elements of the EMS and top management's and the implementation team's EMS roles and responsibilities. As well as establishing a solid basis of EMS understanding, the EMS expert will assist the team in conducting the gap analysis, preparing a project plan, estimating a project budget, developing an implementation schedule and milestones, and presenting this information to top management and other key staff in the organization (e.g., first tier managers, union stewards, city councilmen). Early intervention of this type promotes understanding of how the EMS elements are linked to each other and prepares the team to guide the organization through the EMS milestones and activities in the initial phase.

The language of the EMS posed some challenges early in the project. Participants were familiar and comfortable with the more prescriptive command and control approach that generally offered little flexibility in *how* organizations assessed their environmental impacts and *how* they satisfied environmental requirements. In contrast, they thought the EMS language and terminology was somewhat vague and open to interpretation and that the EMS requirements lacked sufficient direction. "I think I understand *what* I'm supposed to do, but the standard doesn't tell me *how* to do it," was a familiar complaint.

Early in the program participants discovered the importance of involving employees in understanding and developing the EMS. The City of Lowell, Massachusetts remarked, "When employees are brought into the EMS process they begin to accept that environmental responsibilities are a part of everyone's job in the organization, just as safety is everyone's responsibility. When they are involved in developing a solution to the problem, they are more willing to accept the additional responsibilities that the solutions require. This is a change that can only come through employee involvement at every level." In Lowell, a laboratory technician decided to investigate alternatives to some chemicals used in the organization's processes that have a potential impact but are unregulated. Similarly in Londonderry, New Hampshire, the highway garage

superintendent began to look into non-toxic cleaners as alternatives to those currently used. Employees were aware of their responsibilities in accomplishing their organization's environmental policy goals and took the initiative to reduce their departments' actual and potential environmental impacts. In another case, an employee attended a seminar and learned about a technology to recycle an element used in their operations, potentially saving money and reducing the landfill impact. The employee was interested because he knew that waste minimization was one of the organization's environmental policy goals, and he brought the technology to the attention of management.

The number of "non-environmental" staff and management that began to think proactively about environmental issues as a result of the EMS program (e.g., pollution prevention opportunities, stronger compliance management, and product substitution) was significant. Organizations were going beyond what was required by law. In fact, many examples of changes that entities made in their operations were at the suggestion of people who were not formally trained or had formal responsibility for environmental matters, but recognized the value of factoring environmental issues into their daily business operations and business decisions.

Top Management Involvement

During the first phase every participant complained that there was too much to do and too little time to do it. It was difficult to schedule training sessions and meetings during the workweek. Not every department manager provided time during the workday for EMS activities, and often the work had to be done after hours, or on the weekends. Whether the organization is large or small, public or private, EMS activities are a change from the existing organizational culture. Implementation teams dealt with employees who were uncomfortable with changes in procedure and with new responsibilities. They negotiated with department managers whose priorities may not have included EMS activities. Awareness takes time to filter throughout the organization, about six months for employees to become reasonably familiar and somewhat comfortable with the idea of the EMS. Participants worked hard to bring management into the process. The City of Indianapolis, Indiana remarked, "The demands on management's time have affected their active participation in the process. We hope that in the next few months management can provide the visible support needed to bring the facility workforce together to implement the EMS program." This was a priority for all participants. Top management's leadership, involvement and visibility in the EMS was a critical key to success.

The Implementation Team

An early and key decision in the EMS process was the selection of the EMS Management Representative and the Implementation Team. The EMS Management Representative is the Project Manager and has been delegated top management authority. The Team has a

vital leadership role in planning the EMS project, delegating the tasks, establishing deadlines, collecting and evaluating the work, and providing training, guidance and assistance where needed. The Team members are the organization's EMS experts and champions. Some participants enlisted volunteers for their Team; others made assignments. Teams were varied in structure and in size (See Appendix B for the individual case studies). The most successful teams included representatives from both facility and city management domains, as well as up and down the organizational structure of the fenceline. Team members should have sufficient organizational knowledge and authority in their respective departments. The entire team needs in-depth EMS training and a clear understanding of their roles and responsibilities in order to plan and lead the implementation effort. The City of Scottsdale remarked, "We played more of a 'doing' role than an advisory one in the initial phases. We wanted more experience and expertise ourselves before we delegated tasks to others."

Selecting the "Fenceline"

Participants had already selected a "fenceline" to which they would apply the EMS. Some participants decided to "pilot" the EMS in a smaller section of their organizations (e.g., the water resources department), and then apply the lessons learned throughout the entire local government entity. The City of Lowell remarked, "My facility (a utility) is just a beginning – ultimately, we plan to extend these good practices across other departments like Public Works, Transportation, even the Fire Department, but the initial scope of the project must be manageable." Whatever their fenceline, organizational charts had to be developed or updated. Operations were mapped or flowcharted. It was critical to provide department managers with a clear understanding of the EMS process and its priority to the organization in order to gain their support in gathering information. Many of the participants initially defined project fencelines that were too large and had to be scaled back. All participants recommend starting small, and adding more departments and facilities as EMS experience and expertise grows.

Collecting Baseline Information

Participants conducted a gap analysis to determine what EMS elements already existed in the organization and what had to be revised or developed. A gap analysis is not a compliance audit. It is a snapshot of the organization's management processes, not of its compliance status. The gap analysis is designed to answer the following questions:

- 1) How well are the organization and its existing environmental programs performing?
- 2) What standards of environmental performance does the organization hope to achieve?
- 3) What are the gaps between objectives and performance?
- 4) What existing programs and activities (structure, training programs, policies, and procedures) conform to the EMS requirements and can serve as the best foundation for improved environmental performance?

Management support, employee involvement, and good communication were critical to complete the gap analysis. Without these, it was difficult to collect information, particularly in areas that had a history of problems with environmental issues. Participants agreed that the gap analysis was a task that could be completed by internal staff and was a good way for the implementation team and employees to learn more the activities in each department of the fenceline.

Also, participants completed comprehensive baseline protocols developed by UNC at Chapel Hill and ELI to describe their existing EMSs, their pollution prevention practices, stakeholder involvement, compliance and environmental performance. They also completed monthly “tracking sheets” for GETF.

Developing an Environmental Policy

Implementation Teams focused their attention on developing or revising existing environmental policies to conform to EMS requirements (See Appendix C). MCI-Norfolk, Massachusetts remarked, “It was not necessary to create a new environmental policy. After we reviewed our environmental impacts and organizational goals we revised our existing environmental policy to be sure it conformed to EMS requirements.”

Policies were communicated to all employees in the organization and made available to the public. Three of the most common ways of communicating the policy were 1) publishing them in the annual report, 2) posting them in the reception area of the fenceline, 3) posting them on the municipal website. The Lowell Wastewater Treatment Plant had a unique approach: they imprinted their policy on a custom-made manhole cover and displayed it in the lobby of the facility. Lowell remarks, “We found that communicating the environmental policy to employees throughout the fenceline was a good way to initiate the employee kickoff program. When top management signs the policy, it’s clear that they are committing the organization to accomplishing certain goals and objectives and that the EMS is a priority. We also made sure that our implementation team wore their EMS team-shirts so employees could easily identify them during the kickoff.” Lowell also printed its environmental policy on laminated wallet cards for every employee in the wastewater treatment facility. These are given to all new employees, contractors, and vendors.

Determining Legal and Other Requirements

By far the most challenging but most beneficial task in Phase I was determining legal and other requirements. Participants in every organization involved in the pilot program discovered that there was usually no consistent process and generally no clear responsibility or time schedule in place for collecting this information. Initially there was insufficient awareness about reliable sources to seek this information. Participants shared their favorite sources (Internet, software, trade associations, state and Federal Agencies). In many organizations there was redundancy and inefficiency: personnel in many

departments were determining what laws applied to them. When information was available it was not always well communicated or it was not in a form that was understandable to employees who needed the information. Participants wanted employees to know what laws governed the jobs they were doing every day, and that their individual actions help the organization stay in compliance with the law.

Participants unanimously agreed that this information must not only be made available, but must also be understood by those who needed it at every level and function throughout the fenceline. The City of Scottsdale, Arizona designed a process using their internal website. They posted information about their legal and other requirements on their website. Department managers had the responsibility for assuring understanding of the information in their respective departments. The process was designed to guarantee that every employee throughout the organization had easy access and understanding of the laws and regulations that applied to them. Scottsdale used “read-only” files to maintain their document control procedures and ensure that only authorized staff could update or change the information according to schedule. Scottsdale has found this to be an extremely efficient and effective way to maintain and disseminate this information. A benefit from centralizing their regulatory requirements was the realization that Scottsdale could consolidate its permit process. Scottsdale has been able to consolidate their permitting processes across fifteen departments city wide and reduce their air permits from 23 to 8. Reducing the paperwork streamlined the reporting process, reduced the number of people involved in the administrative activity, and improved the likelihood that more staff could work more effectively on issues that were of higher priority – environmental performance improvements and compliance issues. The EMS process in this case helped the regulatory agency as well as the public entity to reduce paper load. It also resulted in annual savings of \$16,000 for the city.

In spite of the challenge, participants reported that determining their legal and other requirements brought immediate benefit to the organization. Without exception participants believe that this knowledge was an important first step in developing stronger compliance management programs and ultimately in promoting better compliance and environmental performance. Many employees who previously had no understanding of how their jobs fit into the organization’s environmental goals and programs now understood they personally could make a difference in the organization’s environmental performance and compliance.

The City of Londonderry, New Hampshire commented, “While each division of Public Works is aware of what the current regulations are, there is now a consolidated list of those regulations and a designated person responsible for keeping the list current. There is a much wider organizational understanding of legal and regulatory requirements. We’ll adjust our procedures and work instructions to make sure that employees understand that it’s what they do or don’t do every day that will have the greatest impact on our compliance record.”

Employee Kickoff

Participants used some innovative approaches for their employee kickoff meetings. The City of Scottsdale, Arizona conducted a stage show, complete with mascot, music, choreography and costumes. They videotaped the production to use in other awareness efforts throughout the city. The Town of Londonderry, New Hampshire developed employee material celebrating the municipality's extensive apple orchards and featuring the EMS as a way to protect that important resource while managing growth. The City of Lowell, Massachusetts held a series of all-hands meetings at their wastewater treatment plant, one for each shift. Political and facility top management presented the environmental policy and answered questions about what involvement in the EMS would mean to each employee. The union at the Lowell Wastewater Treatment Plant offered a \$200 incentive for employees when the plant becomes ISO 14001 EMS certified. Every kickoff meeting encouraged employees, even those in "non-environmental" departments, to be aware and involved in meeting the organization's environmental objectives.

Lessons Learned in Phase I

- ❑ **Top managers need training to prepare for their leadership role in the EMS.** Most managers were not sufficiently briefed about the scope of the EMS project, the resource requirements, the change management issues inherent in EMS implementation, or the leadership role required of them. This issue can be addressed with custom-focused training for management and with regular and frequent communication established with implementation teams.
- ❑ **The Implementation Team is pivotal to the success of the EMS program.** Team members should be selected for their organizational knowledge, their excellent interpersonal, organizational, and communication skills, and strong project management ability. All of the departments of the fence line should be represented on the Implementation Team. They must have authority as well as responsibility. The team leader is called the Management Representative because top management has delegated him/her the necessary authority to implement the EMS. The Team functions in an advisory capacity, developing the project plan, enlisting buy-in from employees, collecting EMS information and disseminating it across the organization, and providing guidance and leadership as the requirements are being addressed. Implementation Teams need in-depth EMS training to ensure that they have a clear understanding of the intent of the EMS and how each of the elements can be integrated with the current programs.
- ❑ **The role of the Implementation Team is to *lead* the project not to take responsibility for completing all the EMS requirements.** The team provides guidance and assistance to employees throughout the organization in every aspect of EMS activities. In order to do this they must have thorough training, sufficient

authority to delegate responsibilities and top management support, visibility and leadership in establishing that the EMS is an organizational priority.

- ❑ **The language of the ISO 14001 EMS can be vague and subject to interpretation.** This was an initial barrier to participants who are used to more directive protocols. Time should be spent at the beginning of an EMS program decoding the semantics of the standard and understanding the intent of each requirement and how it is linked to the others in the system.
- ❑ **There are resources in the community that can provide support in the EMS effort.** Many organizations that have implemented an EMS are willing to share valuable shortcuts and keys to success with those newly engaged in the process. EPA regional offices and state environmental agencies have information and materials that support pollution prevention and compliance activities. For example, the EPA Headquarters Office of Compliance has developed a Sector Notebook for Municipalities ⁵, which can be extremely useful, particularly in determining legal and other requirements. Many local universities and community colleges have been strongly engaged in providing EMS support (e.g., Georgia Tech, University of Florida TREEO Center, and University of Tennessee at Knoxville) and are sources of reasonably priced training and consulting services.
- ❑ **Awareness, understanding and involvement in the EMS should extend across the entire organization and be recognized as an organizational priority.** One of the central features of the EMS approach is that environmental stewardship is the responsibility of every function and process and employee in the organization. Employees come to enjoy and take pride in their active involvement in the organization's environmental efforts. EMS awareness takes time to filter throughout the organization and for employees to become comfortable with new ideas and responsibilities. Employees will follow management's example, and it is the job of management to develop enthusiasm and commitment for environmental protection and for the EMS. Managers who model EMS involvement and who acknowledge employee contributions have good success in achieving a culture change in their organizations. Regular communication about benefits and successes of the EMS is also important to building motivation and commitment.
- ❑ **The pilot project provided an opportunity to begin reshaping participants' interactions with regulators.** Many commented that past dealings with EPA had a confrontational quality. The pilot project allowed the agency to take on a new role as mentor and partner. All participants interviewed felt this was one of the more valuable outcomes of the project.
- ❑ **It is not sufficient to provide training only to the EMS Project Manager.** The entire Implementation Team must be trained, ideally by an EMS expert, ideally on-site, and at the very beginning of the project to establish a strong foundation of

⁵ US EPA Office of Compliance, Sector Notebook Project – Government Series EPA 310-R-99-001, *Profile of Local Government Operations*, January 1999.

understanding. Management must be willing to commit resources to this training initially, and as needed throughout the program. Additionally, a team dynamic must be fostered and maintained. The Implementation Team has a pivotal role in successful EMS implementation and their ability to work together effectively and to understand and master EMS concepts is a critical key to success.

Phase II: Significant Aspects and Objectives and Targets February 1998- June 1998

Tasks in Phase II included:

- ❑ Conducting a thorough inventory of the environmental aspects (both regulated and non-regulated) of their operations, activities, and services.
- ❑ Developing criteria for determining the “significance” of their environmental aspects and identifying them based on these criteria.
- ❑ Setting realistic objectives and targets in conjunction with significant aspects and environmental policy commitments.

The tasks in Phase II are at the very heart of developing the EMS. They require a thorough and in-depth analysis of the environmental impact of operations, the establishment of environmental objectives and targets, and meaningful employee input and involvement in every department of the fenceline.

ISSUES IN PHASE II

Determining Significant Environmental Aspects

The first task in Phase II was to document a list of the organization’s significant environmental aspects. Significant environmental aspects form the very core of the EMS. An environmental aspect is that part of an organization’s activities, products or services that can interact with the environment. A significant environmental aspect is one that poses a significant risk or can have a significant environmental impact. Various techniques have been used successfully for evaluating significant environmental impacts. The EMS Pilot Project participants used a simple Significant Environmental Aspect Assessment Matrix to compare potential environmental impacts against a set of significance criteria. An example of the significant aspect assessment matrix is in the Appendix C.

First, teams met with each department and constructed workflow diagrams that “mapped” their activities. Then they evaluated the inputs, outputs and processes of these activities for real and potential environmental impacts. Some participants chose to consider the impacts from their contractors and suppliers. Suppliers provide local government entities with necessary goods (e.g., salt and sand for road usage, chemicals for wastewater treatment plants). Contractors operated some of the municipal facilities (wastewater treatment plants) or provided services (roadwork).

Once the list of environmental aspects was completed, each organization chose a set of criteria to determine which environmental aspects were “significant” - that is, which aspects were most critical to manage and control and which were not. Organizations considered a variety of significance characteristics and values based on their individual environmental and organizational goals. The Town of Londonderry, NH surveyed residents about what environmental issues were of most concern to them (See Appendix C for a sample of the survey). Most significance criteria were clearly focused on the organization’s environmental goals, but can also include health and safety concerns depending on the organization’s mission and vision.

The following chart gives examples of significance criteria participants used. There was no requirement to use these specific criteria; participants could select none, one, or more of them or use others that were entirely different. This list is included to describe some of the more commonly used characteristics.

Characteristic	Significant if.....
Regulation	Everything regulated is significant <i>Note: the EMS operates within the framework of the environmental regulatory system. The EMS must manage regulated aspects</i>
Toxicity	The impacts are significant to environment and health where toxics alone pose a danger.
Solid Wastes	Any waste stream greater than 5 tons per year
Volume	Any occurrence where volume alone might pose a danger (e.g., releases of water)
Frequency	A repeated occurrence which creates a nuisance because of its frequency
Energy Use	Any use that costs \$1,000.00 or more per month or total usage if greater than \$10,000.00 per month
Water Usage	Any use over 5,000 gallons or total use over 25,000 gallons per week
Complaints	Five complaints or more annually for an existing nuisance
Public Perception	Any potential situation or occurrence that is likely to impact public relations if it occurs

The City of Scottsdale and the Town of Londonderry decided to poll their citizens about what environmental aspects were considered most significant. They conducted a community-wide survey to discover which environmental issues most concerned their citizens and factored the results into their prioritization criteria. This was also an excellent method to publicize information about the EMS and their participation in a national pilot program.

Once chosen, the significance criteria were applied consistently to the list of impacts. Those impacts that met or exceeded the significance values were designated as “significant aspects” and would be addressed by the EMS. Finally, participants

documented their procedure for determining significant aspects and formally entered it into their document control system.

Stronger Operational Control

Without exception, every participant in the program felt that the significant aspect analysis was one of the most valuable tools of the EMS process. Organizational benefits included better understanding and management of operational issues, expanded capacity to address both regulated and non-regulated issues in their operations, and increased opportunities to implement pollution prevention strategies. For example, the Massachusetts Corrections Institute (MCI) at Norfolk recently ordered a new above ground tank for storing small amounts of oil at its power plant. The tank was double walled and met all the legal requirements regarding its construction and placement on site. The EMS Management Representative remarked, “Before our significant aspect analysis we would not have considered that we could take steps to *prevent* possible environmental impacts associated with this new piece of equipment. We would have accepted at face value that the tank met all its legal requirements and that would have been that. However, we realized that placing a pad under the new tank would help us contain a spill if one occurred. We convinced management that the few extra dollars spent now for the pad would be ultimately much less expensive than the cost of remediating the area later if a spill occurred.” The City of Indianapolis remarked, “A listing of a current inventory of chemicals and Material Safety Data Sheets has been generated for operations. Chemicals identified as out of use were eliminated and inventoried for re-use potential. The Environmental Resource Division has arranged that all orphan drums be immediately disposed of by our Hazardous Waste Disposal contractor instead of being staged at the operations site for disposal. The Training Division has become more aware of additional training needs within operations.”

EMS tools were extremely useful in risk management, and in that context, liabilities, accidents, and privatization. Participants used workflow diagrams and significant aspect analyses to identify operational hotspots where an accident might occur. They developed plans and programs to reduce the probability of these incidents. Staff and management developed a more comprehensive understanding of their potential exposure. With reduced liability the asset value of the facility was increased. The EMS offered a consistent process and tools to assess and reduce environmental liabilities, potentially reducing insurance premiums, improving municipal bond ratings, and increasing the value of the municipal assets. A stronger bond rating offers a major financial incentive to a community. The Town of Londonderry saw their bond rating increase from A1 to Aa3 during their EMS implementation. While they did not attribute this to their EMS alone, the EMS Project Manager remarked, “We believe the EMS played a major role in our bond rating change. The EMS and our Sustainable City Initiative were the only significant changes in our application.” In another example, Wayne County, Michigan was facing the privatization of a number of its county facilities. Wyandotte Wastewater Treatment Plant believes that the EMS will help them be more competitive and viable as a business entity. Finally, New York City Transit Authority has included EMS

requirements in contract specifications and they expect to reduce the overall costs of rehabilitation projects.

Every participant has a similar story about how the EMS provided tools and opportunities to prevent non-compliance by institutionalizing a proactive approach for managing environmental issues. The EMS Management Representative from Lowell, Massachusetts remarked, “We have learned and implemented an effective tool for defining our environmental priorities and responsibilities. We have identified areas where we can really mess up and where we need strong operational control. We have identified areas where employee competence in a particular area is critical to the environment. We expect that identifying our significant environmental aspects will increase our ability to stay in compliance.” Some organizations credit the EMS for helping them go “beyond compliance”, to address some environmental aspects that are not regulated, e.g., odor management and energy efficiency. The EMS Management Representative from Wayne County, Michigan reported, “Prioritizing our significant environmental impacts helps us push the envelope and raise with management more environmental issues that we feel we can address through the development of additional programs.”

As previously mentioned, an added and unexpected benefit of the significant aspect analysis was the usefulness of the workflow diagrams. Organizations used them to clearly identify their actual and potential environmental “hotspots” and to indicate areas where employee competence was particularly important. They made note of the operations that were associated with significant aspects. They indicated which activities needed operating criteria, procedures and controls; regular monitoring and measuring activities; and emergency preparedness and response plans, which would be developed in future phases of EMS activity. The workflow diagrams were also useful for evaluating the adequacy of their employee training programs to ensure that all staff understood the environmental implications of their jobs and were competent to perform in the most environmentally and operationally responsible manner. The Erickson Station Electric Utility in Lansing, Michigan used the diagrams beyond the EMS. The EMS Management Representative remarked, “The facility diagrams have also been used in situations outside the scope of the EMS development. These are a valuable resource when identifying process changes, in training new employees and for promoting understanding between departments.” Through the significant aspect analysis, participants began to experience the potential of the EMS as a problem identification tool. Once the problems were identified and prioritized, organizations were asked to establish some measurable performance goals for managing meeting their environmental and organizational objectives.

Objectives and Targets

Because significant environmental aspects are the environmental hotspots of operations, organizations generally set goals for what they want to achieve in their management of these areas. Objectives are the environmental goals organizations want to accomplish in their environmental programs. Municipalities not only want to maintain and expand their

good compliance practices, but also want to take advantage of pollution prevention opportunities in non-regulated areas and provide services to their stakeholders in an economically and environmentally responsible way. Targets set out the detailed performance requirements and the schedule organizations will maintain in progressing toward achieving their environmental objectives.

Each municipality in the pilot project established its own objectives and targets based on its individual organizational goals, environmental priorities, and policy commitments. Some of the objectives applied to the entire local government entity, some to the entire fenceline, some to individual departments. Examples of objectives and targets for each participant can be found in individual case studies in the Appendix B.

Measurable Indicators

A key element in the EMS process is measuring progress toward achieving objectives and targets. Top management reviewed the objectives to ensure that they reflected the organization's business, financial, operational and technological realities. Each organization's objectives were quantifiable or measurable, so that progress could be tracked and reported. For example, the City of Gaithersburg, Maryland's Department of Public Works (DPW) identified runoff from outdoor vehicle washing as a significant aspect. One of their objectives was to reduce oil, grease, and other pollutants entering the storm sewer system. A target was to construct a new wash bay for equipment and vehicles to minimize water runoff from outdoor vehicle washing. After reviewing this objective, the city council estimated that raising necessary funds for this capital expenditure would take five years. The Implementation Team changed the target to "reducing the frequency of outdoor vehicle washings by 10% each year for the next five years until the new technology will be fully funded." This was a target that could be measured, would reduce the environmental impact of outdoor vehicle washing over time, would increase the environmental understanding and stewardship of DPW employees, and gave the city governors time to meet the budget demands of a new technology. Another objective was to reduce oily debris in the waste stream. Their target was to report in three months the cost/benefit of using a vendor to pickup oily shop rags from the maintenance garage, clean and return the rags for reuse. The City of Gaithersburg found that it was both economically and environmentally feasible to recycle their shop rags in this way.

Reducing energy use was an objective of the Wastewater Treatment Plant in Lowell, Massachusetts. Their electric usage averaged \$1 million per year. A number of environmental management programs have helped reduce energy costs including the use of motion sensors to control lighting in three buildings. This has saved the City \$20,000 over a one year period. Other programs involving the efficiency of pumps and aeration equipment are also being investigated.

The City of Scottsdale wanted to reduce paper use in City offices. Their target was for all existing copiers to "double sided" as the default setting (instead of single sided default

setting) and to write the same default requirements into contract specifications for new copiers. They expect to reduce their paper use and save a considerable amount of money. This expectation is based on a similar program at Intel Inc. a company located in Scottsdale, who found that by changing from a single sided to a double sided default setting saved them \$100,000 over three years.

MCI-Norfolk set an objective to establish a new chemical management program in their power plant. One target was to complete a chemical inventory within a one-month period. As a result of the inventory, MCI-Norfolk revised its chemical buying and storage procedures to safely store chemicals in quantities below regulated volumes. Not only did they reduce their potential for environmental impacts; they promoted greater employee awareness, understanding and competence in handling chemicals, and eliminated some regulatory requirements as well.

While some participants set targets to reduce their environmental impact, others plan to maintain their current status. For example, the Town of Londonderry, New Hampshire has experienced 45% growth over ten years and continues to grow at a rate of 4% annually. One of their objectives is to *maintain* their present volume of curbside residential waste pickup in spite of their continuing growth. One way they plan to accomplish this goal is through expanded community education and outreach programs for the Town recycling and solid waste programs.

It was during this phase of EMS activity, that participants began to see a change in organizational culture with regard to the environment. Previously, where organizations had described their environmental goals only in terms of compliance with environmental laws and regulations, they were now seeking opportunities to prevent pollution, to reduce the demand-side of their operations, and to initiate programs for non-regulated issues like odor management and energy efficiency. Some participants involved their contractors and suppliers. For example, the Director of the Capital Programs Management Division, New York City Transit Authority (NYCTA), sent letters to 600 contractors and consultants informing them of NYCTA's EMS program and encouraging them to do the same. Some of these have already called and asked for more information and what they should do.

In fact, after about twelve months of EMS activity, participants were broadening their definition of environmental protection and the role that each should play in environmental stewardship. The Town of Londonderry remarked, "As part of the EMS, better materials management was identified as a commitment in our Environmental Policy. In line with that policy, decreased water usage has been identified as a benefit. Thanks to the EMS, employees at the Highway Garage took it upon themselves to look at High Pressure-Low Volume nozzles and other pollution prevention techniques to reduce water usage. This tells us that environmental awareness and stewardship are beginning to be institutionalized. Of course, supplemental benefits are lower costs as well"

Although participants had not had the opportunity to gather data on the effect of the EMS on each organization's environmental performance and compliance, by the end of the first year of the program, participants were reporting in monthly tracking documents a

greater understanding of environmental issues and enhanced confidence in the organization's ability to manage them. They *expected* that they would have a better compliance record as a result of the EMS. The EMS Management Representative from the New York City Transit Authority reports, "In relatively short period of time we have learned and implemented efficient management tools for defining our environmental priorities and responsibilities. We have developed performance partnerships with our city organizations. We can better prioritize and defend our resource needs. We have raised stakeholder issues, political issues, and technical issues. We have considered financial implication, legal implications and business realities. As a result we have established a much fuller definition of what environmental protection means in our organization. Individually we have grown in our positions over the last few months and can handle our responsibilities with better confidence and competency."

Lessons Learned in Phase II

- ❑ **The significant aspect analysis is critically important and a useful tool in the EMS process.** First, it establishes a basis for building all the other elements of the EMS. Second it inculcates the EMS more fully into the organizational culture because it relies on employee input and involvement in every department and at every level from top to shop. New York City Transit Authority appreciated that the significant aspect analysis made it "easier to have a environmental focus in our discussions because there was better understanding of our operations and environmental issues."
- ❑ **Successful EMS implementation is not possible without top management leadership, visibility, and involvement.** Lansing, Michigan remarks, "In order to provide leadership, management must fully understand what an EMS implies for the organization, be part of developing the project plan, and have a good idea of the human and financial resources that will be required to complete the project." Top management must understand the change management issues inherent in implementing the EMS and the leadership role this requires. They must establish the organizational priority of the EMS, ensure that authority has been delegated to the EMS management representative and the implementation team, and make resources available for completing EMS activities. Regular and frequent communication with the EMS Management Representative and the Implementation Team will help prepare top managers for their leadership role in EMS implementation.
- ❑ **Successful implementation of the EMS depends on employee input and involvement, understanding and buy-in at every level in the organization.** Involving employees in the EMS from the very beginning of the process builds understanding, involvement and commitment for the EMS and helps to institutionalize the EMS into organizational culture. Employees are the ones who know their operations best and will be carrying out the programs, measuring the

progress, and ultimately achieving the goals. They are in the best position to recognize and suggest opportunities for pollution prevention and environmental stewardship in their areas of expertise. The City of Lowell reported that as the facility employees became more familiar with the EMS and their role in it, they began to enjoy their involvement in the cutting edge program. They were motivated by the opportunity to impact national environmental policy as a result of participation in the pilot program and enjoyed being leaders in an innovative project.

- ❑ **Managing organizational change is a significant part of EMS implementation.** "You're asking an organization to change the way it does things, and that's huge," Lowell, Massachusetts remarked. "It takes every day of two years to permeate, to get into the organization ... it's very difficult to do. Organizations should expect and plan for cultural change that occurs during EMS implementation."
- ❑ **Management must ensure that sufficient resources are available to develop and implement the EMS.** Implementation Teams depended on sufficient time for training sessions and regular meetings with employees to accomplish the tasks in Phase II. They set schedules for collecting and disseminating information and conducting analyses. When asked about barriers in this phase, the City of Indianapolis remarked, "TIME, TIME, TIME! We are committed to the EMS as a benefit to our organization. However, everyone has multiple priorities and our lists keep getting bigger!"
- ❑ **Workflow diagrams, maps, or flowcharts are useful tools in the Planning stages of the EMS and in later stages as well.** Process maps helped everyone understand and agree on the inputs, outputs and processes in the department and provided a visual representation of potential environmental "hotspots" and areas where strong operational control and employee training would minimize potential environmental risks.

Phase III: Environmental Management Programs July 1998- January 1999

Tasks in Phase III include:

- ❑ Developing environmental management programs (EMP) to accomplish each objective and target they had set.

Phases I and II focused on establishing an organizational basis for the EMS, developing an environmental policy, determining and understanding legal and other requirements, defining environmental priorities and setting environmental objectives and targets. In Phase III participants developed environmental management programs (EMP) or action plans which described how they would achieve the objectives they had set in Phase II. The plans defined organizational arrangements, structures and relationships. They tasked personnel with responsibility and authority to ensure that the programs worked; allocated

resources; refined procedures and work instructions and provided training where necessary. EMPs required participants to identify potential problems, recommend solutions and provide controlling activities until the suggested changes were in place. Departments also tested and verified that their emergency response plans were effective. Management programs were adjusted or developed to meet compliance obligations and policy commitments.

The resulting set of environmental management programs provided dynamic, short-term blueprints that fully described the activities, resources, and responsibilities for accomplishing the organization’s environmental goals.

ISSUES IN PHASE III

Environmental Management Programs Should be Linked to Policy Commitments

An environmental management program involves narrowing down broad long-term policy commitments and the management of significant aspects through objectives and targets, to a plan of action for meeting environmental performance goals and measuring progress.

For example, an organization’s environmental policy might state that it wants to reduce waste and waste disposal costs. An analysis of significant environmental aspects identifies that the organization accumulates a large number of wood pallets from suppliers, and that these increase their impact on the landfill and their disposal costs. A possible environmental objective might be to eliminate pallets from their waste stream by returning them to their suppliers after the pallets are unloaded. The target might be to reduce the number of pallets by 30% in December 1999, 70% by April 2000 and 100 % by September 2000. They anticipate that their waste stream will be reduced and their landfill costs decreased by a certain dollar amount, perhaps \$70 a ton.

An initial overview matrix in the case of pallets described above might look like this:

Policy Commitment	Significant Aspect	Objective	Environmental Management Program	Department Involved	Responsible Person	Budget	Timing
Prevention of Pollution: Reduce quantities of solid waste	Wood pallets	Reduce waste stream to landfill and reduce waste disposal costs	<ul style="list-style-type: none"> • Inform suppliers that wood pallets must be removed after delivery. • Specify date when program will begin • Count # of pallets currently on site • Review # tons sent to landfill per quarter • Count pallets on site in December, 	Receiving	Receiving Manager (name) Receiving clerk	\$1000 (direct labor costs)	Fully Implement by Sept. 2000

			1999, April and September 2000 <ul style="list-style-type: none"> Evaluate effect on landfill tonnage and cost 	Accounting	Bookkeeper		
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An environmental management program provides answers to the questions *what should be done, when should it be done, who will do it, how will they do it, and how do we measure if it worked.*

The Town of Londonderry, New Hampshire identified a number of significant aspects in its Department of Public Works Highway Garage: solvents, disposal of oily rags, vehicle painting and washing of garage floors and vehicles. Londonderry’s overview matrix looked like this:

Policy Commitment	Objective	Environmental Management Program	Departments Involved	Responsible Person	Budget	Time Frame
Prevention of Pollution: Improve materials management	Prevent any solvent spills	<ul style="list-style-type: none"> Construct berm and fasten tank to wall 	Highway	Highway Garage Mgr and department personnel (names)	\$xxxx (direct labor costs)	April 1999
	Ensure proper health and safety measures and handling requirements are taken when painting vehicles	<ul style="list-style-type: none"> Audit current painting procedures and incorporate necessary recommendations or abandon activity Invite non-regulatory arm of OSHA for a walk through at garage Develop plan to address grey water, including dates of implementation Hire laundry service to clean and recycle shop rags 	Engineering Highway	Engineering and Highway Garage Mgrs and department personnel (names)	\$xxxxx (direct labor costs) \$xxxxx	July 1998 October 1998 May 1998 November 1998

When fully developed, the participants’ environmental management programs will:

- 1) Identify specific action steps;
- 2) Set defined schedules;
- 3) Allocate staff and financial resources;
- 4) Establish individual and group responsibilities;
- 5) Identify any training needs for the staff involved;

- 6) Establish a monitoring/measuring and reporting system to ensure that individual and departmental obligations were being met; and,
- 7) Establish emergency preparedness and response plans.

Developing Environmental Management Programs

As a first step in developing environmental management programs Implementation Teams reviewed their list of significant aspects and the workflow diagrams that identified where in the organization these occurred and how they would be monitored and measured. Implementation Teams met with the appropriate department personnel and confirmed the environmental “hotspots” that involved these significant aspects. Departments reviewed their applicable legal and other requirements, and examined existing operational procedures and work instructions, making necessary adjustments to reduce possible environmental effects. They verified that appropriate operational controls were identified and verified that employees were fully informed of these obligations in their job descriptions. Department managers made note of which employees would require additional competency or awareness training and which job descriptions needed amending.

EMS Documentation

These activities generated a heavier load of documentation responsibility than in previous phases, and some participants hired outside consultants to manage EMS documentation (Lowell, Gaithersburg, and New York City Transit Authority). Others hired college interns and students (Londonderry). The City of Scottsdale managed their documentation via the City website (password and write-protected). Some Teams tasked one member as the “document guru” (MCI-Norfolk, Wayne County, Lansing) to be responsible for making the identified changes. Some recorded interviews with employees “on the shop floor” and drafted written procedures from these conversations. Some created procedure writing teams in each department to draft or modify procedures. Some facilities had procedures and work instructions that were not documented, and this increased the workload. Most were pleased to discover that their existing procedures and work instructions needed very little revision and that the EMS requirements for documentation and document control meshed well with their current systems. MCI-Norfolk remarked “This part of the project has been fairly easy. Our organization is already driven by the types of systems and documentation that is required in an EMS.”

Although the documentation of procedures and work instructions was time consuming, participants found that it was very useful. The manager of the Lowell WWTP remarked, “This process has brought unity to our facility. We know exactly where to find all of our work instructions and procedures, and they are all written in the same format. This makes it very easy to have good communication and for training and provides better consistency in our three shifts. Additionally, we have five departments, and now each knows what the other group does and sees how we are all integrated and how important we each are to the

safe functioning of this facility. This has eliminated jealousies between groups. There's also a feeling that responsibility for what goes on here trickles down from top management through the whole staff."

MCI-Norfolk remarked, "We have always had documented procedures and manuals for the security end of our business. We now have them in place for the environmental aspects of our business. We built our EMS documentation very easily on our existing post orders (procedures and work instructions). As each procedure is drawn up it allows us to implement work procedures that better control activities in each area. We have a high turnover rate of employees, but there's no confusion in anyone's mind about exactly what each employee is required to do. It's all written down in these binders. These post orders ensure that we communicate our expectations in a consistent way. Our employees sign that they have read them and we check frequently on the job that they understand them and are following them. This more than anything else has institutionalized the EMS in our facility. As a result, we are developing sound work procedures for areas that have historically caused us concern because of sloppy work behavior or performance."

Structure and Responsibility

Implementing the management programs moved the EMS from the planning table onto the shop floor of the organization's day to day activities. The EMS approach holds all personnel, even those outside of the organization's environmental functions accountable for the environmental issues associated with their jobs. Implementation Teams worked closely with each department in the fenceline to clearly identify and communicate employee roles and responsibilities vis a vis the environment. Most employees responded positively, and regardless of their job or status in the organization, were interested in helping to protect the environment. In a short time, as described previously, employees throughout the fenceline began to notice and report potential environmental concerns in their areas of responsibility *before* they became a problem and were eager to discover an opportunity for improvement that could reduce risks and save money for the organization.

The EMS Management Representative and the Implementation Team clearly defined and communicated their own roles and responsibilities and the roles and responsibilities of departmental staff with respect to implementing the EMS. Participants developed the following structural guidelines from their experiences in the pilot program:

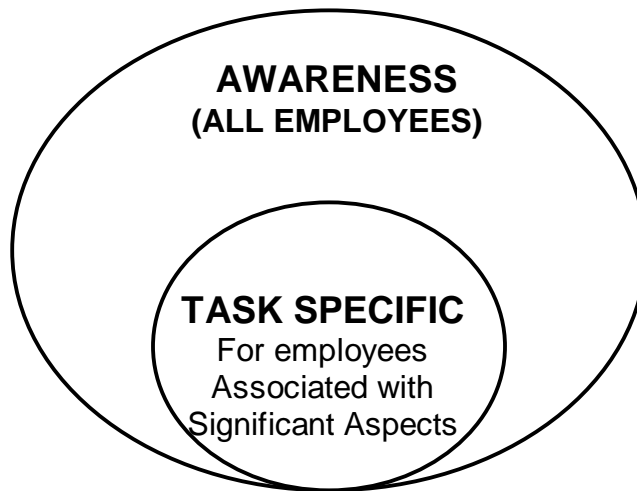
- ❑ Department managers are responsible for completing environmental management activities in their respective departments.
- ❑ Department personnel will be assigned specific task responsibilities identified in the environmental management programs.
- ❑ All employees must know what they are to do, how they are to do it, and that they have authority to do what is required.
- ❑ The Implementation Team acts as advisors, coordinators, and facilitators to these efforts.

- ❑ In order to complete their responsibilities all employees must be supported by the necessary authority, resources, and training.
- ❑ Ultimate responsibility for accomplishing environmental goals remains with senior management.

Training, Awareness and Competency

Once the operating procedures and work instructions were documented and roles and responsibilities clarified, it was important to assess the skills employees required to carry out their environmental responsibilities competently. All employees were given a broad understanding of the organization’s environmental issues and policy and awareness of how their job potentially affected the environment, and some were given task specific training.

Two Areas of EMS Training



As mentioned previously, participants used a variety of training methods and materials for awareness training: wallet cards, T-shirts, shopping bags, and posters for awareness training and understanding of the organization’s environmental goals and priorities. For task specific or competency training they used on-the-job-training; brown bag lunch sessions; all-hands meetings, process charts, videos, and CD-ROMs. In addition, participants kept their training records up to date. They built on their existing training programs and used their documented procedures and work instructions to assure competency in jobs associated with significant environmental aspects. Participants found that incorporating the EMS requirements for training into their operations was relatively easy to complete. MCI-Norfolk remarked, “Employees in the fenceline begin following the new procedures with relatively little complaint because they know that they worked on developing them.” Participants gained compelling benefits from their focus on employee competence. For example, the Lowell WWTP set an objective to develop a strong chemical management program. They stepped up their training on chemical

handling procedures across the entire fence line and “in the past two years have had no chemical spills or mishaps and in fact no near spills.”

Emergency Preparedness and Response

There’s no denying that accidents and emergencies can happen in organizations, but are less likely in organizations that have strong operational control. As part of the EMS approach, participants evaluated and analyzed their potential for accidents and emergencies. They reviewed past occurrences, evaluated why they had occurred, and used them as indicators to where future accidents might happen. Was the accident caused by a lack of training? Insufficient operating criteria or operational control? Was it equipment failure? What could they learn from their previous experience?

Employees evaluated emergency response programs currently in place to ensure that there would be appropriate responses to unexpected or accidental incidents. These responses included procedures for preventing and mitigating environmental impacts during emergency response. Participants reviewed and modified emergency procedures where necessary (particularly after an accident and root cause analysis showed needed changes). Many had not tested their emergency response procedures in a while, and conducted them where feasible. They verified that all employees, including those just recently hired, knew what to do (including communication channels) in an emergency and that roles and responsibilities were clearly defined and communicated. They provided training where necessary.

Some extended these requirements to their contractors and suppliers. For example, the Town of Londonderry, New Hampshire announced tenders for waste hauling and included in their contractor specifications a requirement to review the handler’s emergency preparedness and response plans. Five companies responded to the tender, none objected to the requirement, and those that did not have emergency response plans developed them in order to compete.

Lessons Learned in Phase III:

- ❑ **The key to successful environmental management programs is to integrate environmental responsibilities into the daily responsibilities of all employees.** Environmental management is part of everyone’s job. All employees (and sometimes contractors and suppliers) will be carrying out environmental management programs and accomplishing objectives and targets as part of the day to day operations. Existing job descriptions and work instructions will be revised or amended to reflect environmental management roles and responsibilities.

- ❑ **Roles and responsibilities must be clearly identified and communicated throughout the organization.** Effective delegation, explicit responsibilities and clear lines of reporting will minimize problems and confusion. EMS roles and responsibilities are more easily understood and become part of everyday business if they follow existent organizational hierarchy rather than forming a separate structure. An organizational chart is fundamental to define structure and lines of communication. Problems occur without a clear understanding of roles and responsibilities. Resources may not be properly allocated. Employees may feel that “this is not my job”. There may be a duplication of effort or lack of coverage of some tasks. The organization may not be adequately prepared to respond to emergencies. Responsibilities that are supported by the necessary authority and sufficient training will enable employees to carry out their tasks effectively.
- ❑ **Senior management is ultimately responsible for the organization’s environmental performance.** Management delegates some of its responsibility to qualified and experienced personnel. In the case of the EMS, management delegates responsibility to the EMS Management Representative. Appropriate authority accompanies the responsibility, and management clearly communicates throughout the organization the limits of authority and responsibility for this individual. Management commits sufficient resources and training to ensure the EMS Management Representative and the Implementation Team are competent to carry out EMS duties.
- ❑ **Senior management leads by example.** One of the most important responsibilities for management is to set an example that the EMS is a priority and that environmental stewardship must be integrated into everyday business activities and decisions.
- ❑ **The Implementation Team *facilitates* the EMS approach.** They are cheerleaders, advisors, trainers, problem solvers, but it is not *their* management system. Top management commits the organization to an EMS approach and is responsible for the commitments made in the environmental policy. The responsibility for the implementation and maintenance of the EMS rests with top management.
- ❑ **Implementing an EMS changes the organizational culture.** There is a shift in focus, away from a singular focus such as environmental compliance, to a broader commitment to manage all the organization’s impacts, both regulated and non-regulated. All functional areas of the entity are involved in environmental management, not just the environmental department. Process improvements and changes occur as a result of better employee understanding and involvement.
- ❑ **Documented procedures and work instructions are useful training tools.** They promote operational consistency, cross-functional understanding, and help to institutionalize the EMS. They do not need to be newly created, but are best built on existing practices.

- ❑ **For some organizations, outside support is useful for managing the EMS documentation requirements.** Some participants hired consultants; others used the services of interns or college students.

Phase IV: Monitoring and Measuring and Management Review February 1999- July 1999

Tasks in Phase IV included:

- ❑ Monitoring and measuring key characteristics of the management system.
- ❑ Conducting EMS audits.
- ❑ Developing and implementing procedures for handling EMS nonconformance.
- ❑ Determining the organization's compliance status.
- ❑ Initiating a Management Review cycle.

Measuring, monitoring and evaluating are the activities that ensure the organization is performing in accordance with its environmental management programs. Organizations make policy commitments to compliance, prevention of pollution and continual improvement, so getting feedback on how well their planned activities are working and what modifications are needed is an important part of the EMS process.

Senior management needed data and information as part of the management review process to judge if the organization was achieving its environmental goals. Was the EMS being carried out as planned? Was the organization achieving its policy commitments and its objectives and targets? During the final phase, Implementation Teams gathered information and data so that senior management could answer these questions and make a determination if the EMS was suitable, adequate and effective.

ISSUES IN PHASE IV

Monitoring and Measurement

Participants looked first at the procedures for operations and activities that could impose a serious threat to the environment and then at the monitoring and measuring procedures they presently used in these areas. Were environmental performance indicators, operational controls, and conformance with environmental objectives and targets being tracked and was the information being recorded and supplied to management? How were they evaluating their compliance with environmental laws and regulations? MCI-Norfolk remarked, "The designated fenceline is conducting business in a much cleaner manner. We just don't do some of the things that caused us problems in the past. I think this is because of an awareness of the program and the fact that people know that systems are in place that monitor and measure their everyday activities."

Monitoring equipment was calibrated and maintained and records of the process were kept according to the organization's documentation procedures. The City of Indianapolis remarked, "The drum rack system is in place, and all existing expendable drums have been removed. Better housekeeping in the garages is evident. Also, we have begun a regular monitoring program which will include touring the garages on a regular basis to ensure that there is not a build-up in the number of drums." The City of Gaithersburg was able to reduce the amount of salt and sand they used to treat roads in winter. When they began to measure the volumes used, they realized that a lesser amount would do the job just as efficiently. This reduction had a positive effect on their wastewater treatment plant load.

Procedures for determining how the organization would measure progress toward achieving its objectives and targets were developed and participants made decisions about how they would evaluate their compliance with applicable environmental laws and regulations.

Conducting Compliance and EMS Audits

Participants developed procedures for evaluating their compliance with the law (e.g., compliance audits or inspections) and will use these procedures as they implement their EMS.

Participants had been encouraged to begin the EMS audit process very early in the EMS development. Group audit sessions provided the opportunity for participants to audit and discuss each other's documentation at a number of the training sessions. Some participants (New York City Transit Authority) hired outside consultants for the internal audit function, but most selected staff members to serve on EMS internal audit teams. Most organizations chose to break down the management system into auditable parts rather than audit the entire system at one time. The Town of Londonderry, NH chose to audit its environmental policy before moving on to the rest of the EMS (See Appendix C for the Londonderry, NH audit sheet). Initial preparatory activities included selecting and training the audit team, allocating resources for the audit function, determining the audit scope, developing auditing procedures and audit protocols, establishing an audit schedule, and maintaining audit records. Management was fully briefed on the conduct of the audit and received the audit report. Information from the audit activity provided constructive input into the development of the environmental management programs and aided in the process of continual environmental improvement.

During the audits, teams sometimes found "nonconformances," a term that describes management programs which are not conducted in conformance with the organization's set policies, procedures, objectives or targets. In areas where nonconformances were found, organizations were encouraged to investigate the problem and identify the root cause of the nonconformance (e.g., insufficient training, deviation from procedures or operational controls) and implement a corrective action. Some thought was also given to preventive actions that would prevent repetition of the nonconformance in the future.

The corrective and preventive actions were documented and tracked, with the expectation that these patterns would be useful for avoiding future occurrences.

The Management Review

It was the job of the Implementation Team, and particularly the EMS Management Representative to provide senior management with sufficient information and records to make an assessment of the effectiveness of the EMS. Information that was provided to management included EMS audit results, corrective and preventive actions, progress on objectives and targets, reports of emergencies, new legislation affecting the organization, suggestions for improvement from employees, new customers, growth and development plans, change in land use, results of compliance assessments and the results of previous management reviews.

Lessons Learned in Phase IV:

- ❑ **Train an audit team of two or three employees.** Auditors must have some independence of the function they are auditing in order to maintain objectivity and impartiality. A team of more than one auditor allows for employee turnover and scheduling difficulties. The initial audit team will be invaluable in training additional auditors as audit demands increase. Staff who have excellent interpersonal skills, good judgement, tact, and respect for confidentiality make good auditors. Auditors are good listeners and observers who are able to make decisions based on objective evidence. They need strong organizational skills, and the ability communicate well both orally and in writing.
- ❑ **Audit frequently and early in the EMS process to gain on-the-job experiences and confidence.** Don't wait for the entire system to be developed and implemented before beginning the audit function. Early in the EMS implementation auditors can audit the environmental policy and the system procedures for determining legal and other requirements and for identifying significant environmental aspects. Audit teams gain confidence and skills quickly with plenty of on-the-job experience and the audit findings are good lessons learned in developing subsequent portions of the management system. Management must provide sufficient resources (e.g., time and training) for the audit function to be conducted.
- ❑ **Audit teams are encouraged to keep a balanced perspective.** It is as important to identify areas where arrangements are working well as to identify areas where improvements are required.
- ❑ **Keep documents and records simple.** Document only what is required and what you absolutely need.

- **Start small and simple and build monitoring, measuring and evaluating systems over time.** The checking and corrective action activities are key functions in an EMS. Developing organizational competency takes time.

SECTION V: Implementation Status and Resource Commitment

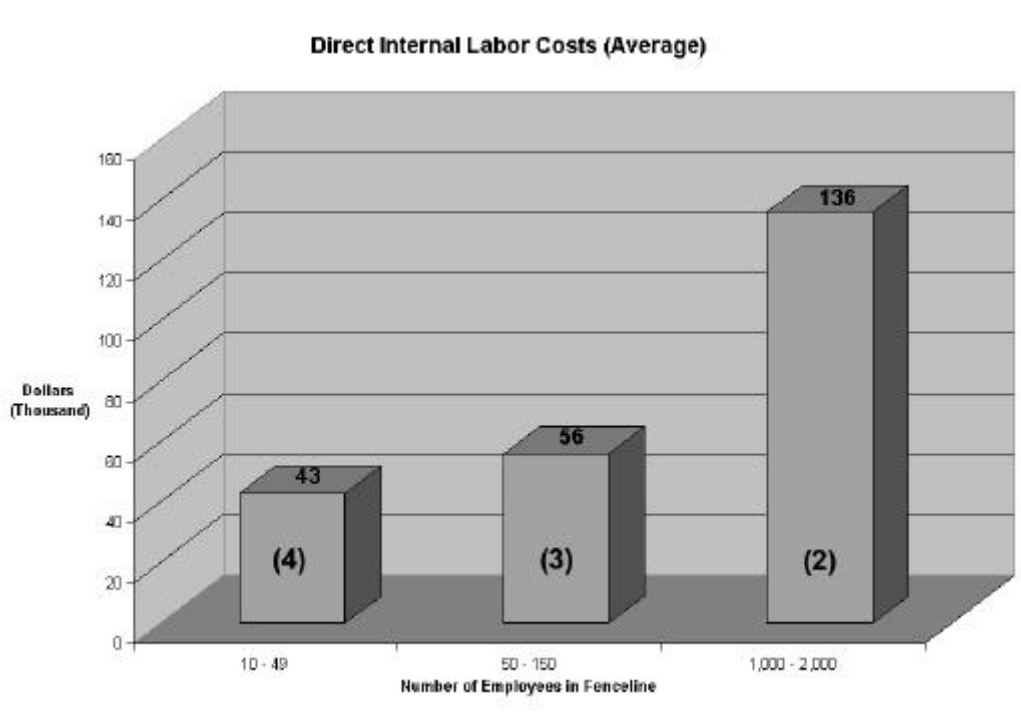
It was expected that all of the participants would complete the seventeen EMS requirements during the two-year period of the pilot project; however, this was not the case. One of the participants completed all of the requirements and achieved verification of their EMS from an independent third party verifier during the term of the project. Five others will seek third-party verification in the near future. Three are undecided whether to seek external or internal verification about the conformance of their EMS.

Appendix D shows the range of EMS requirements that each organization completed.

Resource Requirements

Participants tracked monthly expenses associated with their EMS activities throughout each of the four phases of implementation. Direct labor costs account for the bulk of the financial resources participants invested. Other costs include travel to training sessions, in-kind contributions, and materials. Figure 1 illustrates the direct internal labor costs (average) incurred for implementing the EMS over a 21-month period. The expenses of each participant are examined in Appendix B *Case Studies*.

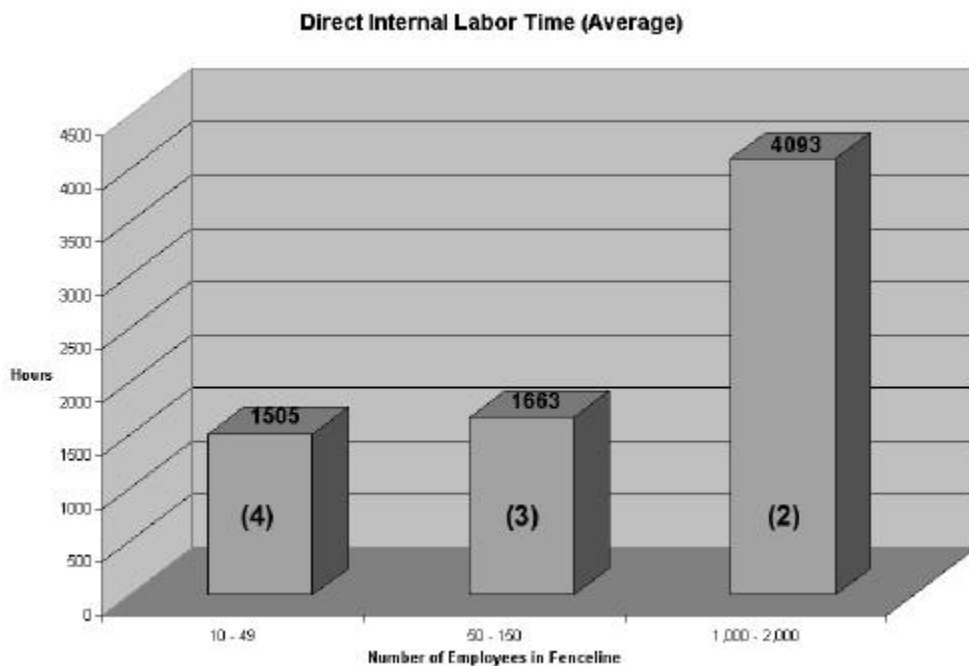
Figure 1:



The number in parentheses indicates the number of participants in that size category.

In addition to the EMS Management Representative and the Implementation Team, city government personnel, community activists, administrative support staff, legal departments, and environmental managers contributed time to the EMS program. Figure 2 illustrates the total direct internal labor time (average) committed to implement the EMS over a 21-month period.

Figure 2:



The number in parentheses indicates the numbers of participants in that size category.

Consultants

Four of the participants utilized the assistance of consultants. Each of these participants used a consultant to address specific needs. The services provided by the consultants ranged from additional training, to establishing a documentation system, to full-blown assistance with implementation. *Table 1* breaks down the time and cost of the consultants' services for each of the participants.

Table 1

Organization	Consultant Time	Consultant Costs
Wayne County	80 hours	\$2,400
Indianapolis	102 hours	\$9,700
Lowell	210 hours	\$10,500
NYCTA	1,110 hours	\$143,000

As can be seen from Table 1, one of the participants, the New York City Transit Authority, chose to rely heavily on consultants to develop their EMS. While this is certainly an acceptable approach for any organization, it is not, in most cases, necessary to rely heavily on consultants to develop an effective EMS.

SECTION VI: Benefits, Barriers and Keys to Success

At the final meeting in New York project participants discussed the benefits and barriers their organizations had experienced during the two-year project.

BENEFITS

1. A positive effect on environmental compliance and performance

PARTICIPANTS REPORT:

With regard to environmental compliance, we have a better understanding of our legal requirements. We have better-trained employees whose competence in their work area is critical to the environment. We expect that our EMS efforts will increase our ability to stay in compliance.

We now know where our operational hotspots are and are beginning to investigate the root causes of some of our noncompliances. This gives us a feeling of control over our environmental issues, rather than responding reactively with a “Band-Aid” approach.

The EMS has provided us a consistent method for finding the root causes of our noncompliances. We are no longer applying reactive quick fixes for violations, but are seeking to eliminate the causes of these violations and prevent future occurrences. Training, communication, monitoring and measuring and regular management review are the EMS tools we use every day that make this possible

We’re able to push the envelope a bit. We’ve been able to carry environmental protection into areas where EPA doesn’t have regulatory programs, but which are of significant concern to our citizens, such as odor control. There are unregulated environmental issues that we’ll develop management programs for in an effort to serve our customers better.

2. Improved environmental awareness, involvement and competency throughout the organization

PARTICIPANTS REPORT:

As a manager my skills have improved as a result of an increased understanding of the organization and its environmental issues. My knowledge about operations has been broadened and I have an increased understanding of technical and personnel issues.

There’s a much better understanding of environmental issues in every department of the fenceline, not just in the environmental department. We are recognizing simple internal “housekeeping” measures that are having a positive effect on our environmental performance. We have self-imposed additional requirements to help prevent pollution,

reduce energy use, manage our contractor, and expand environmental education for our citizens. Employees are bringing ideas for reducing our waste streams, for less toxic products. There has been a definite improvement in involvement and morale!

There are many more people aware and involved in environmental protection and stewardship than ever before. There's a sharing of responsibility because a link has been formed between the environmental department and other departments.

3. Better communication about environmental issues inside and outside the organization

PARTICIPANTS REPORT:

We know much more about our environmental issues than we did 18 months ago. Consequently we are more articulate in our conversations with other departments, other bureaucratic systems, with the state, with our own regulators, and with our neighbors.

People now have an avenue to bring up environmental issues. There are fewer stigmas in being involved in environmental programs.

We have better communication with our vendors. It's easier to require them to maintain an environmental focus that is consistent with our policy and our objectives.

One would think government agencies would be in compliance but more often than not they aren't. State agencies have an ethical obligation to stay on the right side of environmental issues. Public recognition is a crucial factor. There's a better recognition and fuller understanding of the appeal to voters of reducing environmental liability and the costs associated with it.

4. Improved efficiency, reduced costs, greater consistency

PARTICIPANTS REPORT:

Systematically analyzing compliance issues revealed an opportunity to save money. Fifteen departments were responsible for obtaining their own air quality permits – 23 altogether. The implementation team consolidated these permits into 8, saving the city \$16,000/year.

In a relatively short period of time we have learned and implemented efficient management tools for defining our environmental priorities and responsibilities. We have developed performance partnerships with our city organizations. We can better prioritize and defend our resource needs. The EMS tools give us a better understanding of what we are required to do and the means to do it consistently, competently, and efficiently.

5. Better relationships with regulators

PARTICIPANTS REPORT:

In the past, every time the EPA showed up it was because of a compliance issue or a consent decree. The EMS is our opportunity to develop a proactive program.

We have seen improved relations with our state regulatory agency as a result of our EMS activities. We believe the state is quicker to provide technical support, and has been much more supportive of us in general.

We have discovered several state and federal EPA offices that can (and have) provide us technical assistance in our sector.

The pilot project has provided an opportunity to reshape our interactions with our regulators. Our past dealings with EPA had a confrontational quality. The pilot project allowed the agency to take on a new role as mentor and partner. This was one of the more valuable outcomes of the project.

BARRIERS

1. Managing organizational change

PARTICIPANTS REPORT:

A systems approach requires a fundamental change in how the organization addresses its environmental issues. The most common remark we hear is, "That's not my job – it's the environmental department's job. It's beyond our job description."

As we develop programs that build environmental stewardship and improve how we manage our environmental obligations, we must also develop programs that manage human and organizational resistance to change.

An EMS promotes increased awareness and understanding across the entire organization. A 30-year employee has acquired a considerable knowledge base over his employment period. In our organization knowledge is power and not always readily shared. System thinking can be threatening to employees.

Overcoming the "firefighting mentality" has been challenging – in our organization a reactive response to environmental issues produces one or two heroes. There are entire departments of heroes in an EMS because it's proactive – the entire organization shares the credit for managing environmental issues.

There's a motivational barrier here - no news is good news – good news is no news.

2. Lack of top management visibility and involvement

PARTICIPANTS REPORT:

Change management requires top management leadership and visibility and personal involvement, not just lip service. Management needs a better grasp/understanding of what an EMS requires of an organization and of their role in the process before deciding to implement it.

3. Organizational issues

PARTICIPANTS REPORT:

There's a steep learning curve. We've had frequent management change, downsizing and staff streamlining, and employee changes in our Implementation Team.

Moving beyond the planning stage and integrating the EMS approach into existing systems has been really difficult because there is not understanding and buy-in organization-wide. We have not involved enough staff "on the shop floor."

Time, Time, Time! Time is an essential resource ...it's very limited and there is an erroneous perception that the EMS is above and beyond normal work duties. Dollars are abstract – but time is concrete and while management has assured us the necessary dollars they allow too little staff time during the Getting first tier management buy-in and cross-functional responsibility for EMS implementation has been a challenge. EMS implementation is viewed as the Implementation Team's project.

The EMS Implementation Team has been given the responsibility but not the authority it needs to facilitate implementation.

Establishing and maintaining a paper trail of consistent processes, procedures, and records is time consuming.

4. Lack of public awareness, understanding and buy-in

PARTICIPANTS REPORT:

"Is this a regulatory requirement? We already have programs to manage our compliance." If it isn't required by compliance, top management isn't going to do it.

You are expected as a municipality to already do this. There is little public knowledge, interest or appreciation – "Why should we be excited? Isn't that your job?" If the public demands the EMS then it will happen. Lack of public awareness or concern makes it difficult to prioritize the EMS in the budget process.

There's a lack of awareness or understanding about the benefits that the EMS has brought to the organization and the value it will bring in the future. Local government entities can realize many more benefits than just being in compliance, and we've broadened the performance indicators we are using to measure our success. We haven't communicated this fact well to the city management or to the public, so there's little demand from our clients – the citizens – for the EMS.

5. Political uncertainty

PARTICIPANTS REPORT:

“The EMS is not institutionalized yet. We have a new administration in the wings. We hope the EMS won't be seen as the last regime's program.”

“If your top management support (city manager or select board) leaves, you are back to ground zero and need to go back and educate to regain support.”

KEYS TO SUCCESS

While there were many lessons learned in the program, participants agreed there were four essential keys to EMS success:

1. Top management commitment and support is essential to the success of the EMS process.

Employees are always eager to determine who is leading the charge for a new initiative. If management is visibly involved, there is a clear indication that the initiative has a high priority and deserves employee attention. In a local government entity it's particularly useful for facility managers and political leaders to be united in their support and involvement in the EMS.

Top managers must be sufficiently prepared to understand and take on their leadership roles. Many take their EMS training along with the Implementation Team. Topics that should be addressed in EMS training include an understanding of the EMS principles and requirements; top management role and responsibilities; the implementation schedule; human and financial resource requirements, and the change management issues that will be involved in EMS implementation. The Implementation Team can help management stay involved by communicating regularly and frequently about the progress of the EMS and the organizational benefits accrued during development and implementation. Above all, managers will convince employees that the EMS is a priority more by their deeds than their words.

2. Organizations who build on existing organizational processes and procedures are more successful than those who create new EMS elements.

Most organizations already have in place about 85% of the elements required by the EMS. Rather than recreating what already exists, efforts should be concentrated on reevaluating the usefulness of existing processes, making revisions as appropriate, eliminating redundancy, and improving communication and access to the information throughout the organization. An EMS is a dynamic system that relies on continual improvement of management processes and matures over years of implementation.

3. The Implementation Team is pivotal to the success of the EMS program.

Team members should be selected for their organizational knowledge, their excellent interpersonal, organizational, and communication skills, and strong project management ability. All of the departments of the fenceline should be represented on the Implementation Team. The team leader, called the EMS Management Representative, has been delegated the necessary authority to implement the EMS, and in fact the entire team must have authority as well as responsibility. The Implementation Team functions in an advisory capacity, developing the project plan, enlisting buy-in from employees, collecting EMS information and disseminating it across the organization, and providing guidance and leadership as the requirements are being addressed by employees throughout the fenceline. Implementation Teams need in-depth EMS training to ensure that they have a clear understanding of the intent of the EMS and how each of the elements can be integrated with the current programs.

4. Employee awareness, understanding and involvement in the EMS should extend across the entire organization and be recognized as an organizational priority.

Involving employees in the EMS from the very beginning of the process builds understanding, involvement and commitment for the EMS and helps to institutionalize the EMS into organizational culture. Employees are the ones who know their operations best and will be carrying out the programs, measuring the progress, and ultimately achieving the goals. One of the central precepts of the EMS approach is that environmental stewardship is the responsibility of every employee in the organization. Employees come to realize and take pride in the active role they play in the organization's efforts to protect the environment. EMS awareness takes time to filter throughout the organization and for employees to become comfortable with new ideas and responsibilities. Employees who are involved in the EMS process and who contribute to the development of procedures and work instructions in their respective departments are more willing to accept organizational changes inherent in the EMS implementation. Managers who expect EMS involvement across the entire organization and who acknowledge employee contributions have good success in achieving this culture change. Regular communication about benefits and successes of the EMS is also important to building motivation and commitment. Employees will take their cue from management whose job it is to develop enthusiasm and commitment for environmental protection.

CONCLUSION

Data and information collected in the pilot project shows that an EMS provides local governments with incentives and strong management tools to meet regulatory and compliance responsibilities and integrates well with existing compliance and health and safety programs. In the words of the EMS Management Representative from Lowell, Massachusetts, “This worked!”

The EMS helped government entities factor citizen and other stakeholder concerns and organizational priorities into their annual environmental objectives and targets and to design robust management programs for meeting these objectives. In addition to better environmental performance and compliance, the EMS approach encouraged pollution prevention approaches, increased employee awareness and competence, and extended consistency and operational control in areas that have the greatest potential to impact the environment.

Costs for implementing the EMS were primarily the intellectual capital and direct labor charges of the workforce. The fact that all employees facility-wide – not just those in the environmental department - are engaged in environmental protection and environmental stewardship and take pride in their involvement and leadership in cutting edge programs is a step toward realizing a goal in EPA’s *Aiming for Excellence* - “getting more of our society to achieve environmental excellence.”²

Each of the nine participating entities took a risk in committing to a program that required new ways of thinking and new ways of doing business. The public entities that participated in the pilot project not only acted as environmental leaders, but also offered their citizens a higher level of public service. They set standards of excellence that will define future municipal practices for themselves and their peers.

Each city was rewarded with a unique set of benefits that often exceeded their expectations, not the least of these benefits was a more positive relationship with their EPA partners. Without question, the partnership between EPA and participants created an atmosphere that encouraged each entity to take more responsibility, to try unique approaches, and to think more proactively and more broadly about environmental issues than they had before.

These nine local government entities, advanced their environmental management capabilities, resolved some of their environmental challenges, and promoted operational efficiency, consistency and stakeholder involvement as well. This program has demonstrated that public sector organizations, like their colleagues in the private sector, can be strong environmental leaders.

² EPA Innovations Task Force, *Aiming for Excellence, Actions to Encourage Stewardship and Accelerate Environmental Progress*, EPA 100-R-99-006, July 1999, p. 6.

There is little doubt that an EMS approach is beneficial for managing environmental issues in local government entities. The local government entities that participated in the EMS pilot project realized most if not all of the environmental goals that originally prompted their participation. They continue to realize additional environmental and organizational benefits as the EMS matures and becomes more fully institutionalized in their organization.

SECTION VII: Sources for More EMS Information

<p>U.S. Environmental Protection Agency Office of Wastewater Management</p> <p>Web: http://www.epa.gov/OWM/wm046200.htm</p>	<p>U.S. Environmental Protection Agency Office of Reinvention</p> <p>Web: http://www.epa.gov/ems</p>
<p>Global Environment & Technology Foundation 7010 Little River Turnpike, Suite 300 Annandale, VA 22003</p> <p>Phone: (703) 750-6401 E-mail getf@getf.org Web: http://www.getf.org/muni.htm</p>	<p>NSF International PO Box 130140 789 N. Dixboro Road Ann Arbor, MI 48113 -0140, USA</p> <p>Phone: (+1) 734-769-8010 Toll Free (USA): 800-NSF-MARK E-mail info@nsf.org Web: http://www.nsf-isr.org/html/iso_14000.html</p>
<p>American National Standards Institute (ANSI) 11 West 42nd Street New York, New York, 10036</p> <p>Phone: (212) 642-4900 Web: http://web.ansi.org</p>	<p>American Society for Quality Control (ASQC) 611 East Wisconsin Avenue P.O. Box 3005 Milwaukee, WI 53201</p> <p>Phone: (800) 248-1946</p>
<p>American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428</p> <p>Phone: (610) 832-9585 Web: http://www.astm.org</p>	<p>Internet Resource</p> <p>globeNet™ http://www.iso14000.net</p>

Appendix A

Glossary of Terms

Audit - A planned, independent, and documented assessment to determine whether agreed-upon requirements are being met.

Certification - Procedure by which a third party gives written assurance that a product, process, or service conforms to specified requirements.

Certification Body - Body that conducts certification of conformity.

Certify - To provide written assurance that a product, process, or service conforms to specified requirements.

Certified - The EMS of a company, location, or plant is certified for conformance with ISO 14001 after it has demonstrated such conformance through the audit process. When used to indicate EMS certification, it means the same thing as registration.

Compliance - An affirmative indication or judgment that the supplier of a product or service has met the requirements of the relevant regulation; also the state of meeting the requirements.

Compliance Audit - A systematic, documented, periodic and objective review by regulated entities of facility operations and practices related to meeting environmental requirements.

Conformance - An affirmative indication or judgment that a product or service has met the requirements of the relevant specifications; also the state of meeting the requirements. Usually refers to meeting requirements of the ISO 14000 management standards.

Continual Improvement - Process of enhancing the environmental management system to achieve improvements in overall environmental performance, in line with the organization's environmental policy. Note - The process need not take place in all areas of activity simultaneously. (ISO 14001)

Environmental Performance - The measurable results of the environmental management system, related to an organization's control of its environmental aspects, based on its environmental policy, objectives, and targets. (ISO 14001)

Environment - Surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation. Note - Surroundings in this context extend from within an organization to the global system. (ISO 14001)

Environmental Aspect - Element of an organization's activities, products, and services that can interact with the environment. (ISO 14001)

Environmental Audit - Systematic, documented verification process of objectively obtaining and evaluating audit evidence to determine whether specified environmental activities, events, conditions, management systems, or information about these matters conform with audit criteria, and communicate the results of this process to the client. (ISO 14010)

Environmental Impact - Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products, or services. (ISO 14001)

Environmental Management System (EMS) - Organizational structure, responsibilities, practices, procedures, process, and resources for developing, implementing, achieving, reviewing, and maintaining the environmental policy. (ISO 14001)

EMS Audit - A systematic and documented verification process to objectively obtain and evaluate evidence to determine whether an organization's environmental management system conforms to the EMS audit criteria set by the organization, and to communicate the results of this process to management. (ISO 14001)

EMS Audit Criteria - Policies, practices, procedures, or requirements, such as covered by ISO 14001, and, if applicable, any additional EMS requirements against which the auditor compares collected evidence about the organization's EMS. (ISO 14011)

Environmental Performance Evaluation - Process to measure, analyze, assess, report, and communicate an organization's environmental performance against criteria set by management. (ISO 14031 WD4)

Environmental Policy - Statement by the organization of its intentions and principles in relation to its overall environmental performance, which provides a framework for action and for setting of its environmental objectives and targets. (ISO 14001)

Environmental Target - Detailed performance requirement, quantified wherever practicable, applicable to the organization or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives. (ISO 14001)

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

Gap Analysis – A comparison of an organization's existing management structure for environmental aspects against the elements of an environmental management system. Used to identify what EMS elements are missing.

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

Quality System - Organization structure, procedures, processes, and resources needed to implement quality management. (ISO 8402)

Stakeholders - Those groups and organizations having an interest or stake in a company's EMS program (e.g., regulators, shareholders, customers, suppliers, special interest groups, residents, competitors, investors, bankers, media, lawyers, insurance companies, trade groups, unions, ecosystems, cultural heritage, and geology).

Standard - A recognized unit of comparison which provides a gauge of the "correctness" of those things we are comparing.

System - Collection of unit processes that when acting together, perform some defined function; what an organization will do, who will do it, how will it be done. (ISO 14004)

Third Party - Person or body recognized as being independent of issue involved, as concerns the issue in question. Note - Parties involved are usually supplier ("first party") and purchaser ("second party") and external auditor ("third party"). (ISO/IEC Guide 2)

Verification - Process of authenticating evidence. (ISO 14010) The act of reviewing, inspecting, testing, checking, auditing, or otherwise establishing and documenting whether items, processes, services, or documents conform to specified requirements. (ANSI/ASQC A3)

Appendix B

CITY OF LOWELL, MASSACHUSETTS

SECTION I: BRIEF DESCRIPTION OF THE MUNICIPALITY

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

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

Part of Lowell’s public commitment is as follows: “Our community is proud of its past, ambitious in its current progress and excited about its future prospects. Whether you are considering moving your business or your family to Lowell, you will find a warm welcome waiting for you.”

SECTION II: “FENCELINE” DATA

As its fenceline, Lowell chose the Lowell Wastewater Utility for this pilot project. It was chosen because of the environmental nature of its primary mission. The City also felt this was a perfect fit due to the Department’s progressive approach in searching out new methods to improve its operations. The Utility is an activated sludge wastewater treatment facility with a design flow of 32 million gallons a day (mgd). Its average flow is 31 mgd. In 1998, the facility produced approximately 23,540 tons of quality biosolid for land application or composting. Some of its environmental impacts include: odor, air emissions, noise pollution, soil and water contamination from chemical leaks, energy consumption, resource recycling, and effluent quality.

The facility provides primary and secondary treatment to more than 170,000 users located in five communities, Lowell included. The system includes 230 miles of sewer lines, 5000 catch basins, and the same number of manholes. The facility is staffed with 46 employees.

SECTION III: TOP MANAGEMENT FOR THIS PROJECT

Assistant City Manager
Executive Director of Lowell Regional Wastewater Utility

SECTION IV: THE CORE TEAM

Before the project was initiated, information concerning the ISO 14001 standard and Environmental Management Systems (EMSs) was posted throughout the Utility. Once everyone was given a chance to read the information, a memo was posted asking for volunteers interested in making a commitment to an ISO 14001 Implementation Team. Thirteen employees volunteered, one of which is from management.

The core team consists of:

Executive Director
Maintenance Division – 4 employees
Operations Division – 2 employees
Engineering/Pretreatment Division – 2 employees
Laboratory – 1 employee

During the course of the project, the original 13 member core team lost 3 members due to members leaving for new positions. The Core Team currently consists of 10 members.

SECTION V: WHY AN EMS - DRIVERS

The City of Lowell believes the EMS will:

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

SECTION VI: OBJECTIVES AND TARGETS

The initial identification of the Utility's objectives and targets was first assigned to each division to identify those pertinent to that division. Objectives and targets were identified for Operations, Maintenance, Engineering/Pretreatment, Laboratory and Administration. Once this task was completed, the Implementation Team identified the objectives and targets of each division with the greatest impact on the environment.

The areas the team identified were:

- Landfill/Waste Management;
- Chemical Management;
- Odors;
- Energy Usage; and,
- Industrial Waste Stream Notification.

The identification of these objectives led to the development of targets for each of the programs developed.

SECTION VII: STATUS OF THE EMS

The following are the five major programs identified for the EMS:

1. Waste Stream Management
2. Chemical Use Management
3. Energy Reduction
4. Odor Control
5. Industrial Notification

The EMS Implementation Team has conducted Utility-wide training and has performed an in-house audit on the EMS policy and the Waste Stream Management and Chemical Use Management programs.

The core team will complete final Utility-wide training and then perform an audit of the remaining programs (Energy Reduction, Odor Control and Industrial Notification). After this is completed, the Core Team will prepare for an external audit of our program. We anticipate conducting a complete Utility-wide audit of the EMS in January 2000.

The Waste Stream Management Program was implemented in April 1999. As a result, the Utility has seen an increase in the amount of recyclable material collected and a decrease in the amount of material disposed of at the landfill.

Recyclable materials collected (April 1999 – June 1999):

• Pounds of Paper	1,853
• Pounds of Cardboard	4,000
• Pound of Co-mingled	319
• Pounds of Batteries	79
• Pounds of Broken Mercury Vapor Lamps	16
• Pounds of Lamp Ballasts	430
• Feet of Mercury Vapor Lamps	2060

During this three-month period, the program has reduced the waste stream load to the landfill by about four tons and has saved the Utility over \$300.00. Through preliminary energy reduction strategies, the Utility has seen energy savings of \$7,400 over a 10-month period.

SECTION VIII: KEYS TO SUCCESS

1. The top key to our success in developing and implementing the Environmental Management System has been a supportive upper management as well as a hard working and dedicated staff at the Wastewater Utility. Once support was obtained from Management, the City Council and other elected officials it made it possible for the Department Head and the staff at the Wastewater Utility to move ahead with the project. If it wasn't for the dedicated staff and their high skill level and understanding of the EMS concept, implementing it and making it happen, we would not be where we are today.
2. Another key to success was our decision to hire a consultant to assist with document control and the development of the EMS manual. These two areas were a weakness for our team, the consultant filled this gap and will help prepare the Utility for certification.

SECTION IX: HURDLES

The following hurdles were encountered during the development of the EMS:

- Time – there is a tremendous amount of time involved in training and implementation. Educating employees about the ISO 14001 concept can be time consuming as well.
- Money – The members of the Implementation Team and Core Team committed a significant amount of work time to be involved in this project. Money was also spent on consultants and

will be spent on certification. In-kind contributions by members of the community were also significant.

- Turnover in staff – Our Core Team suffered a loss in key staff that were involved in the documentation process which ultimately cost a significant amount of time developing the Environmental Management System.
- Show of support and buy-in from the community– There was some support from the City Council and the local media channels but support was lacking from the community. Councilor support was demonstrated by funding the ISO trips and presentations. Local media provided positive stories about the project. However, we did not see a strong excitement level in the community concerning the project.

SECTION X: BENEFITS

- Improved communication – Communication was improved at all levels - communication within the plant among divisions, from staff members to the Department Head and Executive Director through all levels of the administration including the City Manager’s Office. This increased communication led to a better operation of the plant as well as the top management having an increased knowledge of the issues which ultimately leads to better support of the projects in the department, and a better understanding of resources needed to create a top-notch facility.
- Shared decision making – The Core Team developed a strong inter-relationship which led to improved operations through risk taking and improved communications - going out on a limb knowing that there was a trust level at the facility that had been created because of the EMS process. This trust led to real open discussion of the issues in the department and generated potential and creative solutions.
- Employee empowerment – The employees in the department, for the first time, received a big picture view of the department and of the City and how all the different divisions tie together to form an efficient operation.
- Increased efficiency - Reducing the material waste sent to the landfill will result in cost savings. Improved permitting review will result in a more efficient operation. Established objectives and targets will lead to an overall better plant and better service to our customers.

SECTION XI: LESSONS LEARNED

1. Bring on a consultant early on – It would have been helpful to have a consultant on board during the early stages of implementation to assist with the training of the Core Members and members of the facility. Training and education of the ISO 14001 standard took quite a bit of time. This time sink could have been minimized had we hired a consultant to aggressively train all the members of the facility. Consequently, we hired a consultant a year and half into the project to assist with our documentation that we found very useful. This assistance would have proved very beneficial during the preliminary stages of the project.
2. If we were to do it over again, the City of Lowell would have included an additional facility within its fenceline – we are examining the possibility of developing an EMS for another City

Department. The two-year project was a long and involved process. Including another facility in the training and education phase would have eliminated duplicating our efforts.

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

SECTION XII: CONTACT INFORMATION

Mark Young
Executive Director
Lowell Regional Wastewater Utility

James Smith
Assistant City Manager
City of Lowell

Matthew Donahue
EMS Advisor
City of Lowell

SECTION XIII: TOTAL COST/RESOURCE COMMITMENT DURING THIS PROJECT

The table below indicates the dollars spent by the City of Lowell from August 1997 through July 1999 in planning, developing, and implementing the City's EMS. Travel costs represent costs for the City of Lowell personnel to attend meetings and workshops hosted by the U.S. Environmental Protection Agency during the pilot program. All figures are in nominal dollars.

Labor	Consultant	Travel	Materials
\$27,100	\$10,500	\$3,100	\$1,700

SECTION XIV: FUTURE EMS PLANS

The City of Lowell is committed to getting certified as an ISO 14001 entity at our Wastewater Treatment Facility. The City is also examining the possibility of developing and implementing an ISO 14001 system at our Department of Public Works and eventually at other City Departments.

CITY OF GAITHERSBURG, MARYLAND

SECTION I: BRIEF DESCRIPTION OF THE MUNICIPALITY

The City of Gaithersburg is located along the I-270 high technology corridor in the heart of Montgomery County, Maryland. The southeastern border of the City lies 12 miles from the northwestern border of Washington, D.C., and 18.5 miles northwest of the U.S. Capitol Building. The City of Gaithersburg occupies 9.93 square miles, with an estimated 1999 population of 49,500 people and per capita income, based on the 1990 Census, of \$18,845. The City is host to more than 2,000 businesses and is one of the three core locations for the biotech industry in the United States. In addition, the National Institutes of Standards and Technology (NIST) headquarters is located in Gaithersburg.

Gaithersburg became an incorporated town in 1878 and was elevated to city status in 1968. The City operates under the council-manager form of municipal government, with the City Manager being appointed by the City Council. The Mayor and City Council are elected to staggered four-year terms and the Mayor serves as Council President.

The City's Mission is as follows: "The Gaithersburg City government exists to provide quality, cost effective, priority community services for its citizens. We are a CHARACTER COUNTS! City that serves as a catalyst for the involvement of residents, businesses and organizations to ensure that Gaithersburg is a great place to live, work, and play".

SECTION II: "FENCELINE" DATA

Gaithersburg chose its Public Works, Parks Maintenance & Engineering Administration's facility as the fenceline for this pilot project. The activities and services provided by this Department have the greatest impact on the environment as compared to other City departments. The potential impacts include air emissions, potential spills and accidental releases, hazardous material storage, energy consumption, road salt usage and storage, and storm water discharges. Since the Department provides some of the services valued most by the citizens, the City felt that implementing an Environmental Management System (EMS) for this Department would help improve operating efficiency thus improving service delivery to our customers.

This department provides a variety of services such as:

- Snow removal;
- Street sweeping;
- Storm water management and maintenance of storm water infrastructure;
- Repair and maintenance of streets and sidewalks;
- Beautification of the City's streets, public buildings and parks;
- Curbside recycling;
- Recycling drop-off for used oil, used antifreeze, mixed paper, aluminum, and metal cans;
- Maintenance for all City facilities;
- Construction and capital improvements for all City-owned buildings and facilities; and,
- Fleet and equipment maintenance.

The Department also reviews storm water management and sediment control plans, street locations and configurations, traffic routing, lighting, paving, and site plans for proposed

commercial and residential developments. The Department's engineering staff administers capital improvement projects for road and storm drain projects.

The Department operates with a staff of over 60 full-time, up to 20 part-time and 4 contract employees. The Department of Public Works has a budget of \$6.6 million for fiscal year 2000. This includes labor and overhead costs and capital improvements.

SECTION III: TOP MANAGEMENT FOR THIS PROJECT

City Manager
Deputy City Manager

SECTION IV: THE CORE TEAM

Gaithersburg has appointed a ten person Core Team to plan, develop and implement the EMS for the Department of Public Works. The EMS Project Manager is the Assistant to the City Manager. The Core Team consists of the following personnel:

- Assistant to the City Manager
- Director of Public Works
- Superintendent of Public Works
- Environmental Specialist
- Engineering Technician
- Team Leaders from the 5 functional areas (fleet maintenance, beautification and landscaping, parks maintenance, street maintenance, and recycling/mowing).

SECTION V: WHY AN EMS - DRIVERS

A major force for developing an EMS for the City of Gaithersburg's Department of Public Works were members of the City's volunteer Environmental Affairs Committee. In particular, one member believed that in conjunction with the City's new environmental standards, the development of an EMS would depict the City as a leader in environmental protection.

Gaithersburg believes that the EMS will:

- Help the City do a more thorough and accurate job in monitoring and controlling the environmental impact of the services provided to residents;
- Increase the efficiency and productivity of Public Works' operations while meeting all environmental obligations;
- Increase employee and citizen environmental awareness in order to improve the work environment for employees and the quality of life for citizens;
- Help attract new businesses; and,
- Identify areas for continuous improvement through measuring and monitoring.

SECTION VI: OBJECTIVES AND TARGETS

The City of Gaithersburg conducted a thorough analysis of the real and potential environmental impacts from the significant activities performed by the Department of Public Works. In conjunction with a review of the legal requirements for all the activities, services, and products

provided by the Department, the Core Team developed the following list of Objectives and Targets.

Objective	Target
Reduce oil, grease, and other pollutants entering storm sewer system.	<ul style="list-style-type: none"> • Use indoors wash area as much as possible. • Install oil/grit separator between storm drain inlet and outlet to stream • Construct new wash bay for equipment and vehicles.
Eliminate the need to dispose of hazardous waste generated by parts washer.	<ul style="list-style-type: none"> • Acquire new parts washer that separates oil and grease and recycles water.
Reduce oily debris in waste stream.	<ul style="list-style-type: none"> • Use vendor to pickup and clean oily rags.
Eliminate the potential for battery acid to enter the storm sewer system.	<ul style="list-style-type: none"> • Store abandoned batteries indoors. • Purchase containment structure to capture and contain any potential releases from abandoned batteries.
Algae control in ponds.	<ul style="list-style-type: none"> • Assess the potential to reduce alga growth by aeration and barely bales.
Assess soil conditions and fertilizer needs of grass on city property.	<ul style="list-style-type: none"> • Have soil samples taken and analyzed for nutrients and the need for future fertilizing.
Reduce amount of salt applied to City streets.	<ul style="list-style-type: none"> • Calibrate salt trucks. • Acquire ground sensors to monitor truck speed. • Purchase and use "Ice Ban". • Explore the possibility of mixing ash and salt.
Reduce air emissions	<ul style="list-style-type: none"> • Emission testing for diesel trucks. • Explore the potential of using alternative fuel vehicles.
Environmental awareness training	<ul style="list-style-type: none"> • Conduct environmental awareness training for all Department employees.
UST compliance	<ul style="list-style-type: none"> • Review tank size requirements and conditions of tanks to ensure compliance with State UST regulations.
Emergency Response Plan	<ul style="list-style-type: none"> • Develop, or update, plan.
Storm water pollution prevention plan	<ul style="list-style-type: none"> • Develop and implement SWPPP.

SECTION VII: STATUS OF THE EMS

As of July 1999, the City of Gaithersburg produced a "working draft" of the EMS Manual and environmental procedures for:

- Identification of Aspects and Impacts;
- Tracking of Legal and Other Requirements;
- Setting and Tracking Objectives and Targets;
- Employee Training and Environmental Awareness;
- Internal Communications;
- External Communications;
- Document Control;
- Document Changes;

- Emergency Preparedness and Response;
- Preventive and Corrective Action;
- Audits; and,
- Management Review.

The status of each procedure varies. Many of the procedures are implemented and others are drafts. Those that are drafts depend on training appropriate people in specific activities, such as conducting audits, before they can be fully implemented.

In addition, the City of Gaithersburg has developed and implemented environmental programs for each of the objectives and targets identified earlier.

SECTION VIII: KEYS TO SUCCESS

The success of the EMS has been the Core Team. The Core Team was carefully designed to include representatives from the City Manager's Office and the Department of Public Works. The inclusion of the Director and Superintendent of the Department of Public Works has been vital because it incorporates individuals most responsible for the Department's budget and capital improvement projects.

Another key to success has been the unwavering support of the City Manager and Deputy City Manager for the project. Without their support, the project may have died during the planning process. They made funds available to ensure a qualified professional was hired to be the project champion.

The final key ingredient was the Environmental Specialist. One of the job goals for the creation of the Environmental Specialist position was to lead the planning, development, and implementation of the EMS. This person was able to bring a level of expertise that was lacking in the City government in compliance audits and in the development of the EMS.

SECTION IX: HURDLES

The City of Gaithersburg faced a number of hurdles in developing the EMS. These include:

- Identifying legal requirements;
- Introducing project to employees;
- Conducting a useful gap analysis;
- Developing a baseline;
- Developing a documentation plan;
- Implementing documentation in areas where documentation may not have been required in the past; and,
- Missing work procedures.

SECTION X: BENEFITS

Although the City of Gaithersburg has not fully implemented an EMS by this time (July 1999) a number of benefits are occurring at this time. Once completed and implemented, additional benefits will accrue. The benefits the City of Gaithersburg has or expects to realize with an EMS include:

- Greater operational efficiency;
- Increased employee awareness regarding environmental and safety issues;
- Reduced solid and hazardous waste generation;
- Cost savings from reduced disposal costs;
- Reduced energy use;
- Cost savings from reduced energy use;
- An environmental baseline from which all future activities may be measured;
- Ease in transferring of work roles or replacement of existing employees;
- Keeping current with legal and regulatory changes;
- Identification of potential problem areas that were previously overlooked or viewed as non-consequential; and
- Empowering all employees to raise environmental concerns.

SECTION XI: LESSONS LEARNED

The City of Gaithersburg would have approached the development and implementation of the EMS differently based on knowledge gained. However, the EMS Project Manager took many initial steps in securing the long-term viability of the Department of Public Works' EMS. The lessons learned over the life of the pilot project include:

- The Core Team was and is the strength of the City's EMS. It incorporates personnel from the City Manager's Office and the Department of Public Works.
- The inclusion of Department of Public Works management as members of the Core Team was critical. This enabled quick decisions on capital expenditures and knowledge of potential future capital improvements for future budget discussions.
- Familiarity with EMS and environmental compliance is necessary at the beginning of the project.
- The EMS "Champion" needs to be dedicated to the planning, development and implementation of the EMS.

SECTION XII: CONTACT INFORMATION

For more information please contact:
 Mark Pfefferle (301) 258-6310
 mpfefferle@ci.gaithersburg.md.us.

SECTION XIII: TOTAL COST/RESOURCE COMMITMENT DURING THIS PROJECT

The table below indicates the dollars spent by the City of Gaithersburg from August 1997 through July 1999 in planning, developing, and implementing the City's EMS. Travel costs represent costs for City of Gaithersburg personnel to attend meetings and workshops hosted by the U.S. Environmental Protection Agency during the pilot program. All figures are in nominal dollars.

Labor	Consultant	Travel	Materials
\$19,310	\$0	\$4,600	\$800

SECTION XIV: FUTURE EMS PLANS

Once the EMS is completed and fully implemented, the decision to seek certification with the ISO 14001 standard will depend on guidance from the Mayor and Council. The Core Team intends to complete and implement the EMS by January 2000. If Mayor and Council desire to pursue certification, certification will be sought during calendar year 2000.

TOWN OF LONDONERRY, NEW HAMPSHIRE

SECTION I: BRIEF DESCRIPTION OF THE MUNICIPALITY

Londonderry had a total population of approximately 23,000 in 1998 and is currently growing at a rate of around 4-5% per year. The Town is located sixty miles north of Boston in the southeast corner of New Hampshire. Due to its proximity to the technology highway just north of Boston it has become one of the fastest growing communities in the state. The town has experienced a 45% increase in its population from 1980 to 1990.

This rapid growth prompted the Town to develop a Master Plan to ensure its historical, small town atmosphere is preserved. This plan includes maintaining open spaces, expanding recreational facilities, managing future growth and supporting business development to stabilize the tax base. The town government consists of a Town Council with five elected officers. A charter was adopted in March of 1996 that allows a Town Manager to administer the Town's operations, services and contracts.

Londonderry's five orchards – Woodmont, Sunnycrest, Elwood, Moose Hill, and Merrills – are a vital part of what makes Londonderry special. The apple growers not only contribute to the local economy, but also provide valuable open spaces. Londonderry's Apple Way, is a designated New Hampshire Scenic and Cultural Byway, which winds past orchards, old farmhouses and local landmarks.

Londonderry also has a Sustainable Development program to encourage economic growth in Londonderry while maintaining its rural quality of life. Part of that plan is the Londonderry Eco-Park which is one of only 20 Ecological Industrial Parks in the country. Londonderry's efforts are paying off with a cleaner environment, a protected rural lifestyle, and recognition from federal and state government, including the first ever State of New Hampshire Municipal Pollution Prevention Award.

SECTION II: "FENCELINE" DATA

Londonderry chose its Public Works Department as its fenceline. The Public Works Department was chosen over the other departments because of its immediate environmental impact. The Department consists of the divisions of Solid Waste, Sewer, Highway, and Engineering. The Solid Waste Division has a supervisor and one Solid Waste operator for the Drop Off Center. The Sewer Division consists of one superintendent. The Engineering Division has a Town Engineer, who also acts as the Public Works Director, and one junior engineer as staff. The Highway Division has the largest number of employees with 8 full time and one foreman. The total number of employees in the Public Works Department is 15, including one for administrative duties.

Londonderry contracts much of its services due to its small size. It contracts with the neighboring Town of Derry and City of Manchester for its wastewater treatment. It also contracts with a private hauler for its curbside trash and recycling collections. The town has no transfer station but provides a Drop Off Center that accepts limited materials. The Highway Garage maintains the roads for the Town and has some heavy grade construction vehicles along with trucks used to salt and sand the roads during the winter. Large road projects are contracted out. The Town Engineer reviews and inspects development plans.

SECTION III: TOP MANAGEMENT FOR THIS PROJECT

Public Works Director/Town Engineer

Town Manager

Division Supervisors, Sewer & Solid Waste

Five Town Councilors are committed to the project and kept informed but are not directly involved in its development

SECTION IV: THE CORE TEAM

Due to the small size of the organization and its limited resources, three representatives were deemed adequate to complete the project. The Core Team Initially was composed of the Solid Waste Supervisor (Project Director), Administrative Services Director (Environmental Management Representative) and the Planning and Economic Director. The Public Works Director replaced the Planner half way through the project.

SECTION V: WHY AN EMS - DRIVERS

Londonderry has three Superfund sites, including the Auburn Road landfill that was closed in the late 1970's. While the landfill has now been cleaned up and capped these sites show what can happen when environment issues are not planned for.

Londonderry hopes its EMS will:

- Lower its environmental impact;
- Improve its image as a healthy and safe community; and,
- Increase efficiency and lower risk and liability.

SECTION VI: OBJECTIVES AND TARGETS

Objective	Target
Decrease Solid Waste Quantities	<ul style="list-style-type: none"> • Increase education efforts by %50 • Increase # of Master Recyclers from 6 to 12 • Two school events • Quarterly newsletter instead of bi-annual • Maintain 1998 waste volumes for 1999 • Increase participation of 1st time HHW users by 5% with a corresponding 5% decrease in 2nd time users. Increase collection of used oil by 5% • Increase diversion rate to transfer station by 10%. • Increase curbside recycling rate by 5% • Eliminate disposal of shop rags
Improve Waste Water Quality	<ul style="list-style-type: none"> • Develop P2 pamphlet to be distributed to all SIUs. Add pamphlet to Town website. • Ensure the proper disposal of grey water from garage floor.
Improve Materials Management	<ul style="list-style-type: none"> • Prevent any solvent spills • Ensure proper health and safety measures and handling requirements are taken when painting vehicles.

SECTION VII: STATUS OF THE EMS

The status of Londonderrys EMS is currently seventy five percent complete. The Londonderry DPW has an Environmental Policy, developed roles and responsibilities of all those involved and completed documentation of its legal requirements. The environmental aspects and impacts of each division have been identified which generated a list of significant environmental aspects. From these, objectives and targets were established and Environmental Management Programs developed. The Town has completed its first internal audit and is working on procedures for checking and corrective action and management review.

SECTION VIII: KEYS TO SUCCESS

The two keys to success for Londonderry: 1) having a group of motivated Core Team members to maintain the enthusiasm and momentum for the project and 2) having a temporary project assistant from Antioch College in Keene, NH to help with development and implementation. Number two was extremely beneficial as Londonderry is a small community with limited resources.

SECTION IX: HURDLES

- A more defined list of roles and responsibilities should help in distributing the work load. Documentation is ongoing, locating templates and talking to other businesses to find out how they document their process is of help.
- The most difficult issue currently is keeping to a schedule in a timely manner, sharing the work load and documentation. Regular meetings have helped with scheduling, however with the additional tracking and metrics requirements the work load is becoming difficult and the schedule may have to be lengthened.
- The core team has had some hurdles with staff members with regard to time and resource issues. As we implement the EMS budgetary issues were raised as far as “spending money to save money”. Will it cost the Town money in purchasing equipment or materials to make the program work and where will the funding come from. The core team is focusing on the savings that will be achieved in reduced hazardous waste disposal costs and the benefits of being beyond compliance.

SECTION X: BENEFITS

- The greatest benefit to this program so far has been in defining roles and responsibilities with regard to legal requirements. The organizational role of each division supervisor has been defined. With the EMS in place, a consolidated list of legal requirements has been developed increasing the overall awareness of each division.
- Identifying responsibility for compliance issues
- Better communication between divisions
- Documentation of procedures and work instructions provides *consistent and reliable* methods of dealing with environmental aspects

- Identification of goals to lessen the environmental impact of the town’s activities. I could see this aspect providing support during the budget process when justification for services and activities is required.
- Improved safety for workers by implementing pollution prevention techniques and providing hazardous awareness training.
- As part of the EMS, better materials management was identified as a commitment in our Environmental Policy. In line with that policy, although not part of an environmental management program, was decreased water usage. The Highway Garage is now looking at High Pressure low volume nozzles and other pollution prevention techniques to reduce water - a supplemental benefit, as it will lower costs as well.

SECTION XI: LESSONS LEARNED

The main lesson Londonderry learned was to involve everyone in the project from the beginning. If your employees are not motivated to participate then the process can take twice as long and encounter many difficulties. Also, your community can be doing many environmentally responsible programs already - utilize these efforts to build on your own.

SECTION XII: CONTACT INFORMATION

Liz Todd
 Solid Waste Division
 Town Hall
 Londonderry, NH 03053

SECTION XIII: TOTAL COST/RESOURCE COMMITMENT DURING THIS PROJECT

The table below indicates the dollars spent by the Town of Londonderry from August 1997 through July 1999 in planning, developing, and implementing the Town's EMS. Travel costs represent costs for Town of Londonderry personnel to attend meetings and workshops hosted by the U.S. Environmental Protection Agency during the pilot program. All figures are in nominal dollars.

Labor	Consultant	Travel	Materials
\$22,600	\$0	\$3,600	\$700

XIV: FUTURE EMS PLANS

Londonderry plans to continue to finalize its environmental management programs and eventually seek third party registration. Registration will probably not be achieved until next year, as the funding must be approved through the Town budget process. However, at a recent update on the project for the Town Council, mention was made of expanding the program to include other departments in the town. This would be a significant achievement if the Fire, Police, Recreation and possibly even the schools were included at some later date. The Councilors were very pleased with the project and the benefits it has provided, not the least of which is how it factored into an improved bond rating for the Town last September.

MASSACHUSETTS CORRECTIONS INSTITUTE – NORFOLK NORFOLK, MASSACHUSETTS

SECTION I: BRIEF DESCRIPTION OF THE MUNICIPALITY

The Massachusetts Correction Institute at Norfolk (MCI-Norfolk) is one of 25 facilities used to incarcerate more than 11,000 inmates in Massachusetts. MCI-Norfolk is a medium security facility just south of Boston, with an average daily population of 1,490 inmates. Though it is rated medium security, MCI-Norfolk has a maximum-security perimeter with a wall five thousand feet long and nineteen feet high, enclosing an area of thirty-five acres. Within the confinement of the wall, there is a minimum-security environment of eighteen dormitory-style living units and two modular units divided by a large central grass quadrangle. Other buildings within the perimeter provide space for administrative and security personnel, health services, support staff and services, and other vocational and educational programs.

Originally opened as the first “community-based” prison in the United States, the history and background of MCI-Norfolk is detailed and fascinating. The first of the MCI-Norfolk inmates were transferred from the state prison in Charlestown, MA in 1927, and lived in houses located in The Oval, which is currently at the southwest corner of the wall surrounding the compound. In its early years of operation, a major portion of the present institution, including the prison wall, was constructed by inmates who lived in the State Prison Colony. The more spacious and campus-like atmosphere and architecture permitted an approach to “community life” that was not available at other institutions, and represented a new step in Massachusetts Penology. In the mid-1950's, the name of the prison was officially changed to the Massachusetts Correctional Institute at Norfolk. MCI-Norfolk is the largest facility of its type in the Commonwealth of Massachusetts. Eighty-percent of the inmate population at the facility is serving time for violent crimes. Of that eighty-percent, approximately 275 inmates are serving life sentences for commission of murder in the first or second degree. The next largest crime category is armed robbery, followed by sex offenders.

SECTION II: "FENCELINE" DATA

The Massachusetts Department of Corrections (DOC) chose MCI-Norfolk for its pilot project. The EMS developed at MCI-Norfolk will be used as a model for all DOC facilities. With close to 1500 inmates and 500 staff MCI-Norfolk can be considered a small city. It provides food service, support services, such as health care and education and maintains a fleet of vehicles while the inmates manufacture various products. Such activities generate significant amounts of solid waste, sewage, air pollution and hazardous waste.

MCI-Norfolk focused its efforts on three operational areas: 1) Power plant; 2) WasteWater Treatment Plant; and 3) Correctional Industries Complex. The power plant generates steam and hot water to the entire facility and generates electricity via a diesel generator during emergencies. The wastewater treatment plant handles all waste water/sewage for four correctional institutions within the complex. The Industries Complex includes 6 shops: metal fabrication, assembling and painting shop, clothing/sewing, industrial janitorial supplies shop, silk screening and drapery shop, and a upholstering and mattress shop.

SECTION III: TOP MANAGEMENT FOR THIS PROJECT

MCI-Norfolk Superintendent
MCI-Norfolk Deputy of Operations

SECTION IV: THE CORE TEAM

The core team consists of individuals whose responsibilities revolve around health and safety issues in addition to overseeing the day to day operations of the operational areas. Each individual brings insight and significant experience to the table which was helpful in implementing the EMS.

MCI-Norfolk Environmental Health & Safety Officer
Director of Engineering Services
Supervisors of each operational area

SECTION V: WHY AN EMS - DRIVERS

The Massachusetts Commissioner of Corrections chose MCI-Norfolk site to participate in the pilot project. The MCI-Norfolk EMS may serve as a model for the other corrections institutions.

The MA Department of Corrections continually seeks ways to improve their public relations with the local community and environmental regulatory agencies and improve the way operations are conducted on a day to day basis. Further, implementation of an EMS provides a valuable means by which to monitor compliance with regulatory mandates.

SECTION VI: OBJECTIVES AND TARGETS

MCI-Norfolk's objectives and targets were focused mainly on establishing written work instructions, called Post Orders, and the documented training of employees in those instructions. They mainly dealt with prevention of fuel spills and leaks, cleanup and reporting, monitoring air emissions, safe storage and handling of chemicals and hazardous materials and the generation and disposal of hazardous waste. Lastly, and this became one of our more frequently realized significant aspects, worker safety.

SECTION VII: STATUS OF THE EMS

The EMS process has been a roller coaster ride. We began at a crawl and stayed that way for the initial 8 months of the project. After that, things progressed rapidly and smoothly and we had made significant headway. Then everything changed: our Core Team all but dissolved, due mainly to job reassignments, extended sick leaves, etc. Our EHSO and Project Manager with others, spared as much time as they could to help out, picked up much of the void. Fortunately, some of the original Core Team members had returned and we had reached the point where most of the "heavy lifting" had been completed. Currently, we are at the stage where all of our procedures and policies have been written, signed off and are in place. Training has been documented in the post orders/work instructions for 2 of the 3 areas in our fenceline. All of the management staff have been given an overview of the project and the EMS process. Remaining tasks include: training in work instructions for the wastewater treatment plant employees and the conducting of audits, corrective and follow up actions, etc.

SECTION VIII: KEYS TO SUCCESS

Our keys to success were in three major areas: 1- Commitment from top management; 2- Assistance from the people at GETF who came to our institution, spending 3 days getting us jump-started; 3- Hard work and commitment from those who helped, spending many long off-duty ours on this project.

SECTION IX: HURDLES

- Time constraints are always a problem. Designating one day as ISO day has solved most of the problem. Unforeseen circumstances still make getting everyone together difficult.
- We have experienced difficulty in setting goals and objectives for industries.
- The usual, lack of time, money, and staff.

SECTION X: BENEFITS

- As each procedure is drawn up it allows us to implement work procedures that better control activities in each area.
- We are developing sound work procedures for areas that have historically caused us concern because of sloppy work behavior or performance.
- Again, we have been able to incorporate procedures into our work practices and now have them documented. We have the same manuals that drive the security end now in place for the environmental aspects of our business.

SECTION XI: LESSONS LEARNED

Get real commitment from your top level managers along with a commitment to provide the resources needed, to include staff with a knowledge and background in environmental laws and regulations as well as an ability to spend the time - uninterrupted - that is needed. There is a tendency to take on too much for a fenceline...keep it small and manageable. Also, by keeping it small and manageable, it enables you to bring in more staff that actually work in the areas of the fence line and encourages them to buy into the whole process and the system itself. Do not hesitate to ask the experts (i.e.; GETF, DEP, etc.) for assistance and advise.

SECTION XII: CONTACT INFORMATION

Timothy Hall, Superintendent, Massachusetts Correctional Institution at Norfolk
Michael Toledo, Deputy Superintendent of Operations, M.C.I.-Norfolk
PO Box 43
Norfolk, MA 02056

SECTION XIII: TOTAL COST/RESOURCE COMMITMENT DURING THIS PROJECT

The table below indicates the dollars spent by the MCI-Norfolk from August 1997 through July 1999 in planning, developing, and implementing MCI-I Norfolk's EMS. Travel costs represent costs for MCI-Norfolk personnel to attend meetings and workshops hosted by the U.S. Environmental Protection Agency during the pilot program. All figures are in nominal dollars.

Labor	Consultant	Travel	Materials
\$53,000	\$0	\$2,700	\$1,100

SECTION XIV: FUTURE EMS PLANS

Our immediate plans are to complete the project within the last area of our fence line (WWTP), then, conduct our audits, assess how well we're really doing, make the needed corrections and basically maintain the system. Plans for expansion or the seeking of certification has yet to be determined. However, a better assessment can be made after audits have been completed.

NEW YORK CITY TRANSIT AUTHORITY NEW YORK, NEW YORK

SECTION I: BRIEF DESCRIPTION OF THE MUNICIPALITY

Metropolitan Transportation Authority (MTA) New York City Transit is the largest agency in the MTA network. In fact, New York City Transit is one of the most extensive and complex public transportation systems in the world, operating 24-hour-a-day bus and subway service throughout the five boroughs. New York City Transit has more buses than any other public agency in North America, and the largest subway car fleet anywhere. Each day, close to six million people use New York City Transit - more than 1.8 billion customers annually.

Ridership - The New York City subway system officially opened on Thursday, October 27, 1904. That Sunday, nearly a million customers tried to use it. Average ridership grew to five million daily passengers by the late 1940s. Public transit ridership declined due to the car and highway boom of the '50s and '60s and New York City's fiscal crisis in the '70s. However, ridership figures for the subway and bus are rising steadily again. One reason is the customer benefits that MetroCard offers, especially free transfers, free rides and unlimited rides.

Administration - MTA New York City Transit (The New York City Transit Authority) was created in June 1953 to assume responsibility for the subway system and for bus routes formerly run by New York City's Board of Transportation. From 1953 to 1955, five full-time commissioners were in charge of New York City Transit. This number was reduced to three until 1968, when the Metropolitan Transportation Authority (MTA) was created to oversee New York City Transit's activities. The MTA designated four New York City Transit executive officers to run the organization until 1971, when the MTA appointed a single chief Executive Officer. The title of "president" became effective in 1980. MTA New York City Transit's current president, Lawrence G. Reuter, took office in March 1996. President Reuter and his 12 department heads comprise New York City Transit's senior staff. The President reports to the MTA Executive Director, Marc V. Shaw.

Employees - New York City Transit employs more than 44,000 people in 27 major departments and divisions. In addition to employees responsible for bus and subway operations and maintenance, the work force also includes attorneys, engineers, electricians, computer programmers, iron workers, masons, teachers, physicians, mechanics, carpenters, accountants, environmental specialists and about 250 other types of job titles.

Work Facilities - New York City Transit employees work at 1,500 locations throughout the five boroughs, including 468 subway stations. Locations range from the Jay Street and Livingston Plaza main offices in Brooklyn to the system's 73 storerooms and 54 security posts.

Unions - New York City Transit has contracts with 21 local unions and supervisory organizations representing about 40,000 employees.

SECTION II: "FENCELINE" DATA

The New York City Transit Authority chose its Capital Program Management Department (CPM) as its fenceline. CPM employees 1,700 people in capital projects and numerous subcontractors at any given time. It has direct oversight for \$2 billion per annum of capital projects. CPM is one of the largest engineering and construction organizations in the country: designing for, building

and maintaining, servicing and rehabilitating one of the oldest and best known urban public transport systems in the world.

Initial planning and implementation efforts focused on two sites: 100th Street Bus Depot Replacement and the 72nd Street Station Reconstruction. These two sites represent two different kinds of typical projects in the CPM project range. From this experience, CPM developed procedures for the implementation of ISO 14001 throughout the organization and to register CPM as a whole.

SECTION III: TOP MANAGEMENT FOR THIS PROJECT

Senior Vice President & Chief Engineer, CPM

SECTION IV: THE CORE TEAM

The EMS Core Team as a whole, functions as the steering committee of the EMS Cross-Functional Team (CFT). It is led by the EMS Coordinator, and includes the EMS Director, the EMS Document Administrator and the CPM Chief, Environmental Engineering Division (EED) and a consultant from Clayton Management Consultants.

Ajay Singh, Chief Internal, Controls & Special Projects, is the EMS Coordinator and the designated management representative for the CPM EMS. He is responsible for overseeing the design, implementation and maintenance of the CPM EMS and for making recommendations, reports and presentations to top management, Mysore L. Nagaraja, Senior Vice President, Chief Engineer, CPM.

Jim Strycharz, the EMS Director, a member of the NYCTA CPM Division of Internal Controls and Special Projects appointed by the EMS Coordinator, is responsible for performing such duties as the EMS Coordinator directs and shall otherwise assist the EMS Coordinator with fulfilling his or her EMS responsibilities.

Bill Jehle, Chief EED is an integral part of the EMS. He is responsible for establishing and maintaining a staff of Environmental Specialists who are the link between Program and Support Areas, CPM Projects throughout their life cycles and Project Master Plan Managers. Environmental Specialists conduct environmental aspects/impacts assessments, legal compliance reviews and training assessments and programs.

Bud Smith, Managing Director, Clayton Management Consultants, is the consultant who has helped with design of the EMS as a whole, the implementation strategy and drafting the EMS procedures manual.

SECTION V: WHY AN EMS - DRIVERS

New York City Transit (NYCTA) believes that the EMS will:

- Improve overall environmental performance
- Increase energy efficiency
- Improve resource conservation
- Reduce environmental impacts
- Incorporate Design For Environment in planning, design and construction

SECTION VI: OBJECTIVES AND TARGETS

Objective	Target
Fully implement EMS by 1/31/2000	<ul style="list-style-type: none"> • Environmental Objectives, Targets and Environmental Management Programs established by CPM Program Managers, Design Managers and Construction Managers by April 30, 1999 • Commence Implementation Master Plan, Pre-Design and Design Stages Environmental Operational Controls by July 1, 1999 • Commence Implementation of Bidding Stage Environmental Management Controls by December 1, 1999 • Review and revise, as appropriate, standard form Consultant and Contractor Environmental Specifications in contract language by January 1, 2000 • Fully Implement Evaluations of Consultant and Contractor compliance with applicable Environmental Legal and Other Requirements by January 1, 2000. • Assure by May 1, 1999 that CPM documents relating to Emergency Preparedness and Response are appropriately revised to conform with PMP 313-010 requirements • Assure by December 1, 1999 that non-CPM NYCTA documents relating to Emergency Preparedness and Response (EPR) are appropriately revised to conform with PMP 313-010 requirements
Within 12 months, Design and Implement a System for Tracking and Reducing Additional Work Orders (AWOs) of Environmental Origin (EAWOs)	<ul style="list-style-type: none"> • Complete a study of 1997 and 1998 EASWOs by March 26, 1999 • Set EAWOs reduction targets for remainder of 1999 and monitor and report on performance.
Within 12 months, bring all NYCTA Underground Storage Tanks (USTs) into full compliance with government requirements	<ul style="list-style-type: none"> • Within 12 months, upgrade or replace USTs to bring them into compliance with governmental requirements

SECTION VII: STATUS OF THE EMS

The CPM EMS has implemented and been certified to the ISO 14001 Standard by a third-party, Underwriters Laboratories, since March of 1999. The first Surveillance Audit is scheduled for September of 1999.

SECTION VIII: KEYS TO SUCCESS

Team approach

- Excellent communication and follow-up skills
- Dedicated top management support
- Dedicated leadership and management

- Building good working relationships with the various CPM functions and levels and with management of different divisions/areas of overall NYCTA
- Exercising patience
- Being a good listener
- Allowing widespread EMS ownership by CPM managers and employees
- Using effective project management skills, such as good monitoring and follow-up practices
- Effective briefing of top management during the Management Review is important so that they are knowledgeable when talking to internal and registration auditors
- A strict Internal EMS Audit is best for the organization because it serves to identify and resolve issues prior to the registration audit
- Pre-qualifying and having an open dialogue with the ISO 14001 registrar prior to the commencement of the registration audit serves to resolve potential ISO 14001 interpretation issues up front and avoid surprises and confrontations during the registration audit
- Realizing that the EMS should be continually changing to reflect “lessons learned” and to make it more user-friendly, rather than being “stuck” with the original EMS design

SECTION IX: HURDLES

- The biggest hurdle encountered during the initial implementation of the EMS was discovering and dealing with the fact that implementing some of the CPM’s Procedures and Environmental Management Programs will require cooperation of other areas of the parent NYCTA and MTA organization over which CPM does not have control.
- For example, contractor selection and management issues make up the bulk of CPM’s operational controls. However, to alter the current contractor specifications and contracts requires working with many different areas of the NYCTA and MTA. Gaining cooperation from management of these other parts of the organization requires much patience, dedication and time. The overall organization culture and established authorities make it difficult to obtain the required external cooperation promptly and efficiently.
- Another example of this hurdle was placing the EMS Manual on the intranet. Specific formatting guidelines had to be followed and time frames could not be controlled by CPM, because they are governed by other areas of the organization.
- A third example relates to Emergency Preparedness and Response (EP&R). This activity is handled by another division of the NYCTA. The task of convincing that division to revise its procedures to meet ISO 14001 and CPM EP&R criteria promises to be very “political” and time consuming.
- Controlling documents created outside of CPM or prior to the implementation of the EMS proved challenging. Gathering them, labeling them appropriately and ensuring they fit into the overall system was difficult.
- When determining significant environmental aspects, a reasonable number of aspects must be identified, as they must be monitored and managed. CPM originally deemed all aspects (about 80 in all) significant, which if left unchanged, could result in monitoring and measurement conformance problems.
- Learned some of the initial elements of the EMS were too ambitious or overly complicated and have now simplified the programs/procedures.

- Quantitative indicators for monitoring and measuring may not be easy to devise or they may be inappropriate and may have to look for alternative means.

SECTION X: BENEFITS

- The EMS has encouraged CPM to evaluate some of its current programs, such as how contractors and consultants are evaluated, from a new perspective with added insight
- Provides structure, discipline and context to the strong environmental programs previously in place throughout the CPM organization
- Forces collection and storage of records in an organized manner, making them readily retrievable
- Has promoted Design for the Environment within the CPM organization
- Promotes improved communications with departments outside of CPM
- Volunteer team has provided an employee outlet for energy and excitement about the EMS which aids the EMS Core Team in meeting goals.
- Improved environmental performance
- Improved environmental communication between employees in various areas of the organization, who might not otherwise interact
- Potential cost savings
- Improved public image
- Positive external publicity for the organization
- Increased internal credibility and awareness of CPM's EMS

SECTION XI: LESSONS LEARNED

Key lessons learned that aid in EMS implementation process:

- Total commitment of senior management
- Positive/committed employees through awareness training and volunteers
- Define fence line of organization
- Early involvement of all units/operating departments

SECTION XII: CONTACT INFORMATION

Mr. Ajay Singh
CPM, Internal Controls and Special Projects
Audit Services
370 Jay Street
Brooklyn, NY 11201-5106
Tel: (718) 243-8397
Fax: (718) 243-3805

SECTION XIII: TOTAL COST/RESOURCE COMMITMENT DURING THIS PROJECT

The table below indicates the dollars spent by NYCTA - CPM from August 1997 through July 1999 in planning, developing, and implementing the Authority's EMS. Travel costs represent costs for CPM personnel to attend meetings and workshops hosted by the U.S. Environmental Protection Agency during the pilot program. All figures are in nominal dollars.

Labor	Consultant	Travel	Materials
\$121,000	\$143,000	\$14,000	\$900

SECTION XIV: FUTURE EMS PLANS

CPM plans to continue to implement the environmental management programs it has designed for its EMS and work to continually improve the EMS. Other divisions of the MTA are currently considering implementing EMSs based on the ISO 14001 Standard.

CITY OF SCOTTSDALE, ARIZONA

SECTION I: BRIEF DESCRIPTION OF THE MUNICIPALITY

The City of Scottsdale, Arizona is located in eastern Maricopa County and shares its western boundary with Phoenix. From a tiny farming community of only 2,000 people occupying less than one square mile in 1951, Scottsdale has grown to a vibrant city of 196,310 and 194 square miles. The city is host to 21,000 businesses with a majority found in the retail and services industry. One in four are employed in the hospitality industry.

Scottsdale became incorporated as a town in 1951 and was declared by the Mayor as the “West’s most western Town.” The Charter was adopted in 1961. The city has a council-manager form of government. The mayor and six council members are elected at large to serve four-year terms.

The City’s Vision is as follows: “On our way to the year 2000, City of Scottsdale employees will be recognized as innovative, environmentally sensitive and committed to quality service; members of an organization in which leadership, teamwork and all individuals are valued, and employees take pride in everything they do.”

SECTION II: “FENCELINE” DATA

The City of Scottsdale has selected two departments (Financial Services and Water Resources) as its fenceline. Included within the fenceline are the citywide environmental aspects.

The financial services department consists of two facilities and 120 staff. The Water Resources Department consists of seven facilities and 82 staff. The citywide environmental aspects include 19 facilities and 1,500 staff. The facilities include the following:

Civic Center Campus	Via Linda Campus
Water Campus	Old Corporation Yard
Fire Stations	City Parks
Water Treatment Plants	Planet Ranch
Libraries & Senior Centers	Airport
Westworld	Paiute Center
Transit Center	Other Offices
Citizen Services Centers	Unmanned Well Sites/Pump Sta.
City-owned Leased Properties	Contract Employees/Companies
City Park/Pool/Maintenance Compounds	

The City selected the two departments based on their regulated and unregulated challenges and expects to model our citywide implementation efforts based on their lessons learned.

SECTION III: TOP MANAGEMENT FOR THIS PROJECT

David Ellison, Assistant City Manager

SECTION IV: THE CORE TEAM

Three teams (Oversight/Technical Support Team, Core Team, Steering Committee) comprising of City staff, private industry and regulatory agencies, both professional and technical, were established to help develop, implement and oversee the building of a comprehensive

Environmental Management System (EcoSystem) for the City of Scottsdale. These three teams will support the project managers who are responsible for orchestrating this project.

Project Managers:

Four Members from the Environmental Division

Special Advisors: Risk Management
Public Information Officer

Oversight/Technical Support - Team I

The 9 member Oversight/Technical Support Team is built with representatives of the private industry who have experience in ISO 14001 certifications. This team is responsible for providing technical support to the Core Team and Steering Committee. As part of the stakeholder process, the City's citizen advisory board, the Environmental Quality Advisory Board (EQAB) members also provide input.

- Motorola GSTS
- Allied Signal
- AZ Attorney General Office
- Motorola FPDD
- Arizona Department of Environmental Quality
- America West Airlines
- SRP
- Yuma Proving Grounds
- IBM

Core Team - Team II

The 9 member Core Team is built with top city management and is responsible for providing the support staff from their respective areas to carry out the EcoSystem mission.

- Financial Services, General Manager
- City Attorneys Office, Deputy City Attorney
- Emergency Services, Director
- Community Planning, Administrator
- Community Maintenance/Rec., General Manager
- Organizational Effectiveness, Administrator
- CAPA, Director
- Municipal Services, General Manager
- Water Resources, General Manager

Steering Committee - Team III

The 42 member Steering Committee comprised of City middle management staff, will be responsible for identifying environmental impacts within their respective areas and provide methods to control and maintain.

- | | |
|------------------------------------|-----------------------------|
| Environmental Management Office | Transportation |
| Airport | Traffic Signals |
| Financial Services | Community Development |
| Warehouse | Inspection Services |
| Graphics | Project Review |
| Water Resources | Water Quality/Engineering |
| Water Operations | Municipal Services |
| Community Maintenance & Recreation | Solid Waste Management |
| Contracts | Capitol Projects Management |
| Field Services | Facilities |
| IS/Advanced Technology | Organization Effectiveness |

Preservation
Legal
Emergency Services

Library
Police

SECTION V: WHY AN EMS - DRIVERS

Scottsdale believes an EMS will result in:

- Improved environmental performance;
- Enhanced customer trust;
- Improved regulatory partnerships;
- Reduced liability;
- Improved compliance;
- Improved public image;
- Improved environmental sustainability indicators; and,
- Reduced costs.

“An EMS enables Scottsdale to create our future rather than predicting it!”

SECTION VI: OBJECTIVES AND TARGETS

See Attached Objectives and Targets Document

SECTION VII: STATUS OF THE EMS

The City of Scottsdale is presently embarking upon a relationship with Intelix, a Canadian Software Company out of Toronto, while continuing to implement the EMS components in the pilot fenceline departments (Water Resources and Financial Services). The purpose of the software is to allow the entire City to have access to EMS documents and procedures as well as create a central location to store, track and monitor all documentation.

The City is currently at the implementation stage of its EMS for Financial Services and Water Resources. The Environmental Management Programs (EMPs) are complete and are being implemented through training. Once this is complete auditing of the already existing components will begin. The City is also currently continuing to go to great detail concerning legal requirements. A regulatory guidebook has been created and is available on the EMS web site. In addition, the City is examining past environmental audit procedures and is planning to revisit this process in an attempt to ensure compliance is addressed. Once the departments defined in the fenceline have completed each section of the ISO 14001 standard, the City will begin to implement the system citywide.

SECTION VIII: KEYS TO SUCCESS

- Partnering with local organization who are creating an EMS through the State EMS Pilot Program
- Communication throughout organization
- Example of benefits and how it adds value
- Identify departmental champions
- Resource commitments (human and financial)
- Establish a strong core team

- Have core team meet on a regular basis
- Keep accurate documentation
- Keep top management involved in the project throughout
- Attain the support of not only top management but also middle management
- Demonstrate to those involved that the outcome of the EMS process will benefit their department/division

SECTION IX: HURDLES

- Initial establishment of organizational structure for Oversight, Core Team, and Steering Committee.
- It has been difficult to complete the legal and regulatory requirements matrix and environmental aspects for operations so widely varying as the entire city. Generating buy-in at all levels takes time and marketing, and jumping into these two deliverables without fully integrating into the departmental structure first is cumbersome. Either we are seen as doing it for them, and they become territorial, or they draw back and depend on the Project Managers to complete the tasks for them. First, we approached the communications plan with the construction of a Web page to provide real-time information to employees, which THEN got us full participation in these two tasks. The Project Managers are completing the forms in order to meet expectations of us, but we are concerned that this approach may damage our ability to effectively guide the process later.
- Flowcharting the Aspects for all city operations is a huge task. Again, we are approaching this in two phases, the first being an evaluation of all activities (on a broad scale) at each individual facility and the impacts of each activity. For example, the office building in which the EM office is located has generalized office functions that will share potential impacts. Facilities Maintenance performs tasks in all facilities that have common potential impacts. The second task is to review each activity within each facility and detail the potential impacts of each. Facilities Maintenance will also have activities at pool sites that they do not have at other facilities, so the second phase will identify those unique impacts. The value of this process is to work from general to specific, involving more and more people as we go. With an organization as large as this, this appears to us to be the most effective approach.

SECTION X: BENEFITS

- Coordination of environmental issues, reduction of liability, local publicity, improvement in relationship with private business community.
- Wider organizational understanding of project and legal and regulatory requirements.
- The city has been criticized recently because of its decentralized structure and the perceived flaws (in this case with compliance tracking) that comes from a non-hierarchical system. Developing the baseline documents has allowed for dialogue across departmental lines on these issues and has resulted in a higher organizational awareness of compliance requirements. Ultimately, we believe that the tracking system will allow us to maintain departmental control of compliance issues but centralize tracking, recordkeeping and document control processes and establish the Environmental Management Office as the central “consultant” on compliance issues.

SECTION XI: LESSONS LEARNED

- Create EMS infrastructure from the outset, instead of incrementally

- Communicate effectively with staff involved through various forms of media
- Direct communications based on audience's needs
- Identify issues or outcomes that staff can relate to
- Involve top management
- Meet regularly with core team
- Benchmark with other organizations throughout process
- Limit size of oversight/technical support and steering committee
- Know and understand the ISO 14001 Standard
- Implement policies and procedures as you go
- Applaud all those involved efforts

SECTION XII: CONTACT INFORMATION

City of Scottsdale Environmental Management Office
 7447 E. Indian School Rd., Suite 300
 Scottsdale, AZ 85251
 (480) 312-7990
 Fax (480) 312-2455
 Email: ecogecko@ci.scottsdale.az.us
 EcoSystem(EMS) web site: <http://www.ci.scottsdale.az.us/ecostem>

Randy Grant, Chief Environmental Officer (480) 312-7995 email: rgrant@ci.scottsdale.az.us	Larry Person, Sr. Environmental Coordinator (480) 312-7889 email: lperson@ci.scottsdale.az.us
Dennis Enriquez, Environmental Coordinator (480) 312-7778 email: denriquez@ci.scottsdale.az.us	Garen McClure, Environmental Programs Specialist (480) 312-2743 email: gmcclure@ci.scottsdale.az.us

SECTION XIII: TOTAL COST/RESOURCE COMMITMENT DURING THIS PROJECT

The table below indicates the dollars spent by the City of Scottsdale from August 1997 through July 1999 in planning, developing, and implementing the City's EMS. Travel costs represent costs for City of Scottsdale personnel to attend meetings and workshops hosted by the U.S. Environmental Protection Agency during the pilot program. All figures are in nominal dollars.

Labor	Consultant	Travel	Materials
\$103,000	\$0	\$10,000	\$23,000

SECTION XIV: FUTURE EMS PLANS

The City plans to complete implementation of the EMS in the defined fenceline departments. From that point, the remainder of the organization will begin creating and implementing the EMS in their respective departments. The software, along with the tools that have already been created will aid the remaining departments in this process. There are also preliminary plans to bring in an outside consultant to aid in the set up of a citywide EMS, based on the existing infrastructure. The City has not determined whether or not to seek a third party registration. The focus at this point is to create an implement an EMS that works for Scottsdale.



Compiled List of Objectives and Targets for Water Resources and Financial Services

Water Resources – Water Operations – Chris Heinz, Water Distribution Supervisor and Gary Covert, Water Production Manager

A.

#1 Objective – Prevent contamination from sewer stoppage/spill caused by grease and root intrusion

Target – Proactively reduce number of incidents of sewer stoppages/spills caused by grease by 10% in the next year

Measurement – Proactive restaurant inspection program documenting number and location of grease related sewer blockages

Strategies

- A. Determine source
- B. Contact generating source
 - 1. Check for grease trap and maintenance records
 - 2. Educate on grease prevention
- C. Follow up inspections of grease generator
- D. Document condition of main lines during routine cleaning

#2 Target – Proactively eliminate 100% of the root related problems

Measurement – Proactive program to identify number of actual and potential root caused sewer breaks and abate problems

Strategies

- A. Determine location of roots
- B. Remove source of stoppage
 - 1. Remove tree if possible
 - 2. Remove roots from inside of line mechanically or chemically
 - 3. Put location on annual maintenance program

B.

#1 Objective – Prevent contamination from repairing a water line

Target – Reduce number of incidents of contamination of water system caused by city water line repair by 10% in the next year

Measurement – Document number or repairs per year of waterline and number of incidents of suspected contamination

Strategies

- A. Shut down leaking water line
- B. Remove/replace damaged line
- C. Chlorinate replacement pipe with household bleach
- D. After repair, flush line before reset of meter – flush line to house

- #2 Target** – Reduce contamination of water system caused by consumer water line repair by 10% in the next year
Measurement - Document number or repairs per year of waterline and number of incidents of suspected contamination

Strategies

- A. Shut off house valve
- B. Dig out adequate work space to prevent drained water from entering consumer line
- C. Plug consumer line
- D. Purge and flush after work is completed

C.

- #1 Objective** – Keep water outages to a minimum and their effect on a particular area and the amount of time they persist

Target – Proactively reduce the effect on an area from water outages by increasing the number of valves on the entire system by 25 years

Measurement – total number of valves on the system

Strategies - New valve installation to minimize area affected by shut down

- #2 Target** – Proactively reduce the length of time of a water outage by 10% over the next year

Measurement – Average time between breakage and restoration of service

Strategies

- A. Customer notification
 - 1. Scheduled emergency shut down minimum of 24 hours
- B. Semi-emergency shut down; not an immediate hazard to public health or property
 - 1. Notification to affected area with 1 hour advance notice
- C. Emergency shut down; water doing extreme damage, notification not possible
 - 1. Notify office of situations with estimated time of outage
 - 2. Arrange for secondary water supply; i.e. bottled water for consumption to hospitals, nursing homes, etc...

- #3 Target** – Reduce the volume of water released during a water outage incident by 10%

Measurement – Estimated volume released per incident

Strategies

- A. Valves are accessible
 - 1. Valves plotted correctly on ¼ section maps
 - 2. Valves to be graded
- B. Valve preventive maintenance (P.M.) program
 - 1. Valves are exercised every 4 years
 - 2. Broken valves are identified and repaired as soon as possible

D.

- #1 Objective** – Safely paint fire hydrants every four years and perform blue staking with least amount of complaints/impact to property

Target – Proactively reduce the number of health related injuries resulting from painting fire hydrants by 10% within the next the 4 years

Measurement – Track workers compensation claims/incidents annually related to this activity

Strategies

- A. Hydrant painting
 - 1. use non-lead paint
 - 2. use proper personal protective equipment, i.e. masks, eye protection
 - 3. Prevent over spray with use of tarps

#2 **Target** – Proactively reduce the number of blue staking/perception of graffiti complaints by 10% within the next year

Measurement – Document number of phones complaints

Strategies

- A. Use of chalk instead of paint in residential areas
- B. Use least amount of marking and still comply with request (dots vs. lines)
- C. Use temporary “stake chasers” instead of chalk
- D. Educate public that the function of blue staking is required by law

Water Resources – Water Production – Mike Mahoney, Water Quality Analyst

E.

#1 **Objective** - Protect the health and safety of staff and citizens while delivering environmental services with quality and efficiency.

Target - Promote and ensure 100% accident free days for staff each year

Measurement - Track workers compensation claims/incidents annually related to this activity

Strategies - Provide staff with the proper training, time, resources, and equipment to safely and effectively eliminate the hazards associated with open manholes, noise exposure, airborne pathogens, toxic vapors, and wastewater gas exposure.

#2 **Objective** - Comply with federal, state, and local regulations on schedule and in a quality manner.

Target – Develop compliance schedule tracking system.

Measurement – Proactive schedule implemented by Summer 1999

Strategies - Maintain accessible files and databases that document compliance issues.

F.

Water Resources – Central Groundwater Treatment Facility –Maria Mahar, Water Quality Analyst

#1 **Objective** - To reclassify the spent carbon at the appropriate waste level.

Target – Reclassification from large quantity generator of hazardous waste to conditionally exempt status

Measurement – Status change by 1st quarter 1999

Strategy - Compile and submit TCLP results to submit to ADEQ RCRA for evaluation.

#2 **Objective** - To continue to serve safe drinking.

Target – Zero tolerance for drinking water standard violations

Measurement – Daily sampling results

Strategy - Operate under the Operation and Blending plan guidance document and appropriate sampling plans.

#3 Objective - To operate the air treatment system to optimize VOC removal and carbon life.

Target - Zero tolerance break through carbon

Measurement – Carbon efficiency data

Strategy - Operate under the Air O & M plan and evaluate air samples upon to receipt to confirm change out intervals.

G.

Water Resources – Water Quality –Michelle Dehaan, Water Quality Analyst

#1 Objective - Safe chlorine gas use

Target – Zero tolerance for major release of chlorine

Measurement – Conduct RMP’s and/or Process Hazard Analysis (PHA) on all chlorine gas use facilities

Strategies – Install scrubbers on all facilities with 1 ton chlorine cylinders or more. The City has no history of chlorine gas releases. Chlorine scrubbers would be activated at sites if there were a release where there are large amounts of chlorine gas. Chlorine gas sites will be identified and addressed within the EPA Mandated Water Operations Risk Management Plan.

#2 Objective - Improve untreated water sampling protocol

Target – Zero tolerance for release of contaminated untreated water from sampling.

Measurement – Testing and alternatives development results by 3rd quarter 1999. Implement new procedures by 4th quarter 1999.

Strategies – Pilot study to develop procedures to avoid running non-potable water with high nitrates and/or high levels of TCE on the ground while flushing for sampling.

#3 Objective - Control chlorine by-product levels in drinking water

Target - The ultimate goal is to serve water below the current MCL (100 ppb TTHMs) and below the proposed MCL (80 ppb TTHMs) to all residents.

Measurement – Reduce the number of occurrences of individual MCL exceedences by 10% and reduce annual running average by 1%

Strategies - Water Resources staff has identified many ways to potentially reduce the occurrence of serving water with TTHM levels greater than the MCL. [The City is in compliance with regulations, because the MCL is based off an annual running average of all sites within the distribution system.] Options that need to be reviewed include:

- Retrofit reservoirs avoiding inlet and outlet short-circuiting.
- Create mixing or baffling scenario.
- Reevaluate “fire-flow” requirements and altering amount of stored water
- Evaluate change in disinfectant.

H.

Financial Services – Graphics Department – Ron Tatum, Bid/Contract Specialist

- #1 Objective-** Reduce / eliminate the output of wastewater contaminants produced by the graphics film processors and the costs of containment and disposal per EPA mandate, (federal compliance standards for heavy metals wastewater discharge: < 5 p.p.m.). (*See attachments for current chemical analysis*)
Target – 1) Reduce total volume of wastewater discharge by 10% 2) Reduce wastewater contaminants by 10% 3) Reduce costs for treatment/disposal by 10%
Measurement – 1) Estimated volume of wastewater discharged from processor 2) results of lab analysis on wastewater 3) disposal and treatment budget expenditures
Strategies – 1) Installation of technology to capture and reduce or eliminate waste water contaminants (Purchase of silver recovery/effluent treatment equipment) 2) Explore emerging alternative digital technologies to eliminate the use of these contaminants altogether in the future.(ongoing) 3) Graphics / EMS needs assessment of treatment equipment. Preparation of formal request for Grant moneys for purchase of above technology
- #2 Objective** - The use of environmentally friendly ink products to reduce hazardous waste.
Target – Increase use of vegetable base inks by 10%
Measurement – Inventory of vegetable based inks purchased annually
Strategy - To purchase and use vegetable ink products that reduce contaminants harmful to the environment. (ongoing)
- #3 Objective** – Reduce Environmental Impacts such as Deforestation and Landfill glut through the use and reuse of recycled papers
Target – 1) Reduce amount of paper purchased citywide by 5%
Measurement – Budget for paper purchases
Strategy – 1) Reduce volume of paper used by 5% per department and Reset Copiers to utilize 2 sided copying as a default setting 2) Purchase only those paper products that contain a minimum of 15% post consumer recycled paper. (ongoing) Re-utilization of used paper (back side note pads)
- #4 Objective** - Enhance the air quality in Graphics Industrial Shop environment.
Target – **Reduce number of complaints by 10 %**
Measurement – Document number of complaints annually
Strategies - Installation of ventilation equipment to remove harmful fumes from the work environment. Research and purchase low V.O.C. press chemicals. (ongoing)

I.

Financial Services – Jim Jenkins, General Manager

- #1 Objective** – Reduce paper use in Financial Services over prior year
Target - Reduce paper use related to printers and copiers by 10% over the prior year.

Measurement: Through monitoring paper purchases and copy machine copy counts.

Strategies -

- a) Purchasing Director will select a designee to gather data related to FS paper purchases and copier counts for prior year
- b) Set copier defaults to duplex mode so that all copies are double sided.
- c) Encourage use of telephone and e-mail to send communications electronically
- d) Re-educate employees on how to most efficiently use their copiers.

#2 Objective - Continue office recycling as a means of conserving natural resources.

Target – Increase volume of office recyclables by 5%

Measurement: - Volume of office recyclables from Financial Services offices

Strategies -

- a) re-educate employees on the values of recycling (quarterly)
- b) Work with Solid Waste Management to install consistently colored recycling and waste bins at the corporation yard

#3 Objective- Increase by 20% the amount of batteries our department recycles.

Target – Increase volume recycled by 20 %

Measurement - Compare the volume of batteries recycled in prior year to those recycled in current year.

Strategies -

- a) re-educate employees on battery recycling program (quarterly)
- b) encourage employees to bring used batteries from home
- c) encourage use of rechargeable batteries wherever possible
- d) purchase and install consistently colored battery recycling bins and install them in designated office recycling areas.

#4 Objective - Work with EMO and Risk Management to ensure department compliance with EPA and OSHA regulations.

Target – Zero tolerance for OSHA/EPA NOV's

Measurements – Number of NOV' EPA or OSHA issued annually

Strategies -

- a) conduct regular safety inspections of department facilities
- b) applicable employees shall participate in OSHA required training
- c) ensure all EPA and OSHA required filings are made on a timely basis.
- d) continue participation in OSHA VPP and EPA ISO 14000 programs.
- e) continue annual evaluation of safety program.

WAYNE COUNTY, MICHIGAN

SECTION I: BRIEF DESCRIPTION OF THE MUNICIPALITY

Wayne County is located in southeastern Michigan, encompassing approximately 623 square miles. It is made up of 33 cities, including the City of Detroit, 10 townships, one village, and 47 public school districts. Its population of approximately 2.2 million makes it the most populous county in Michigan. During the first half of the 20th Century the economy was fueled by the significant growth of the automobile industry. Today, the auto industry continues to play a key role in Wayne County, but the economy has diversified to include world-class companies devoted to engineering, banking, health care, and even plumbing fixtures.

Wayne County was established in 1796, as a key unit of the Northwest Territories. The County was incorporated as a charter county in 1967. It is governed by a Chief Executive Officer, who is elected on an at large basis for a four-year term, and a county commission comprised of 15 members elected on a partisan basis for two-year terms. The commission, acting as the County's legislative body, establishes policy and adopts the County budget.

The county services the citizens of Wayne County through the operation and support of numerous Departments including, Adult Probation, Airports, County Commission, Circuit and Probate Court, Community Justice, Corporation Counsel, County Clerk, County / Detroit Public Municipal Reference Library, Detroit/ Wayne Joint Building Authority, Detroit / Wayne County Port Authority, Employee Unions, County Executive, Emergency Management, Environment, Health and Community Services, Huron-Clinton Metropolitan Authority, Information Processing, Jobs and Economic Development, Management and Budget, Personnel and Human Resources, Prosecuting Attorney, Public Services, Register of Deeds, Retirement, Sheriff, and Treasurer.

Wayne County Executive, Ed McNamara, states: "The cornerstone and perhaps the most important objective of this administration is its commitment to providing quality services to its citizens, employees, businesses, and other stakeholders of Wayne County."

SECTION II: "FENCELINE" DATA

The Wayne County Department of Environment (DOE) chose the Wyandotte Wastewater Treatment Facility (WWTF) as its fenceline. The Division of Public Works, part of the DOE, operates the facility which accommodates 13 communities. Each community has a contract with the county to discharge a specific amount of wastewater into the county's interceptor sewers. The origins of the Facility date back to the 1920s. The Facility handles about 60 million gallons of sewage per day (MGD) with a total capacity of 100 MGD. The WWTF is under renovation and upgrading its treatment processes which will more than double the plants capacity. When completed in 2000, the plant will have a treatment capacity of 150 MGD under normal conditions, and 225 MGD under extreme wet weather conditions.

SECTION III: TOP MANAGEMENT FOR THIS PROJECT

Director of Compliance and Public Affairs
Director of DPW
Superintendent Wyandotte WWTF
Supervisor of Industrial Pretreatment, Henry Ruff Field Office

SECTION IV: THE CORE TEAM

- Wyandotte WWTF - Training Manager
Laboratory Manager
Engineer
Departmental Manager
- Industrial Pretreatment - Departmental Manager
- Compliance and Public Affairs - Environmental Specialist
- DPW (Administrative) - Engineer

SECTION V: WHY AN EMS - DRIVERS

Wayne County believes that the EMS will

- Increase the efficiency in which the facility is managed and resources are utilized
- Reduce risk and liability associated with potential EH&S violations
- Improve community relations
- Promote effective inter-communication and sharing of informational resources between departmental/divisional components.
- Improve competitiveness and reduce the risk of privatization

SECTION VI: OBJECTIVES AND TARGETS

The facility has developed objectives and targets which will focus on improvements in Solids Handling Area. These include:

Objective	Target
Odor Management System	<ul style="list-style-type: none"> • Odor needs assessment and equipment evaluation • Preventive maintenance and operational procedures for odor control equipment • Housekeeping program • Employee training program • Complaint tracking and complaint response procedures
Chemical Management Program	<ul style="list-style-type: none"> • Chemical evaluation and waste minimization • Chemical hazard assessment • Chemical storage and handling procedures • Chemical cost evaluation
NPDES Permit Compliance for TSS (Total Suspended Solids)	<ul style="list-style-type: none"> • Preventive maintenance program • Equipment evaluation and modification • Operational procedures, review modification and training • Plant recycle monitoring and reduction

	plan
Reduction in sludge volume being landfilled	<ul style="list-style-type: none"> • Feasibility studies for alternative sludge disposal and reclamation options • Program to track % solids of sludge being landfilled
Preventive Maintenance Program	<ul style="list-style-type: none"> • Computerized maintenance management program
Incinerator Ash Disposal	<ul style="list-style-type: none"> • Ash characterization • Project plan for cleanup and disposal • Contract for cleanup and disposal

SECTION VII: STATUS OF THE EMS

The core team has developed Environmental Management Plans (EMPs) for their defined objectives and targets for the solids handling area. The facility has move forward with implementing the tasks defined to complete their objectives and targets for the Odor Management System. Odor control, odor source reduction, odor complaint procedures, documentation control, and both internal and communication procedures are currently being written. Training, auditing and management review procedures are being developed. Once the system is in place the facility will move forward with implementation of all of their EMPs for the solids handling area and developing objectives and targets for facility wide implementation of the EMS. The Division is also moving forward with plans for ISO 14000 Certification of the EMS and registration of the facility.

SECTION VIII: KEYS TO SUCCESS

Keys to success which have been identified from having gone through the EMS development process would include:

- Research Environmental Management Systems, talk to businesses that have designed and implemented Environmental Management Systems. Try to find similar industries that have done an EMS and use their knowledge in analyzing what type of system would be best for your business.
- Choose a fenceline or area to develop an EMS where objectives and targets will be within the organizational resources to accomplish them.
- Make sure there is commitment to developing an EMS from all top management and interested parties before starting the project
- Try to put together a core team to develop the EMS that has a wide knowledge base of how the organization operates. This should include, as much as possible, all of the internal and external requirements and components which allow the organization to operate, as well as the technical expertise to evaluate the target fenceline processes and activities.
- Top management commitment (this means more than just a “yes” statement) is imperative throughout the project. Roles and responsibilities must be clearly defined, project plans, timelines and accountability must be in place. An EMS point person (champion) must be established as soon as possible with both the commitment of resources and authority to put the plan in place, implement it and hold staff assigned procedures under the EMS accountable.
- Communication is the most critical item. Everyone’s role and responsibility with the organization and their importance to having, and continuing to have a successful EMS must be defined and clearly communicated. Successes along the road to implementing an EMS

need to be celebrated and communicated to the employees, to the communities the organization resides in, and to any organizational partners and interested parties. Continual organizational commitment to the EMS and successes achieved need to be communicated, **continually!**

SECTION IX: HURDLES

- Determining training needs and providing training has been difficult. The project management team has spent a great deal of time trying to understand the ISO 14001 Standard and EMS development processes. Identifying the Key concepts of ISO 14001 and the development and implementation process for an EMS has to occur first before a basis for training needs could be established.
- Availability of training materials has been a problem internally. Providing materials to program staff at the 3 different locations has been difficult. In keeping with the theme of the project it is the goal of the project support staff not to generate excessive paper waste by supplying multiple copies of training materials to project members, but to find alternative methods for distribution. Computer Networking and electronic distribution of materials has not come up to speed as quickly as planned. Links between divisional networks have just recently been established. Protocol for transference of information between Departments and Divisions over Local Area Networks (LANs) and Wide Area Networks (WANs) is still being established. Methodologies, guidelines and procedures for transference and storage of information and documents between project members still need to be established.
- The largest hurdle was getting the project management together to identify key components of the EMS and to move the project forward. The conference deadlines for completing the gap analysis, identifying legal and other requirements, and drafting an environmental policy began the process of creating a procedure for, pulling information together, setting time frames and delegating responsibilities to project members to accomplish defined tasks.
- The Project Management and core team training has progressed but there seems to be difficulty in moving the project from a strictly managerial and planning stage to an implementation stage. Creation of workgroups, communication to employees and involvement of employees other than project management and core team members has not happened. Commitment of staff time and employee availability seems to a major issue.
- The core team has developed quite an extensive list of defined tasks and an implementation schedule. Many of these tasks, though well formulated, have not been defined enough to be implemented within the time frame indicated. No formal training program has been developed to begin coordination of transferring the responsibility of task completion to the assigned coordinators and facility staff. Close examination of tasks related to sludge disposal, odor equipment evaluation and replacement indicate that items should have been budgeted for at the beginning of the process. Objectives and targets that require 3rd party consulting may not be able to be budgeted for until 2000 or 2001. The core team also needs to develop a training plan and begin delegating tasks out into the facility and bringing additional staff on-line to coordinate task implementation. The multitude and magnitude of defined tasks will be difficult if not impossible to complete within the defined time frames unless the EMS development format changes drastically.

SECTION X: BENEFITS

- Some organizational benefits have been realized such as the beginnings of interdepartmental data sharing, communication and cooperation to achieve a common goal. Some heightened awareness of the environmental importance and impact of the activities surrounding Waste Water Treatment Facility has been attained at the upper management, facility management and employee level. The education of the Wayne County Board of Commissioners, regarding the importance of the Waste Water Treatment Facility and implementation of the ISO 14000 standards and EMS is a major step toward educating the community.
- Organizational benefits that have been realized include, better interdepartmental communication, allocation of resources, and time to accomplish defined tasks.
- There has definitely been an increase in the knowledge base of environmental, regulatory, and legal policies and procedures that impact the facility.
- The impact that the facility has on the environment, and its direct (and indirect) correlation with organizational policies and procedures (or lack of) is beginning to be realized, at least at managerial level.
- The facility management and core team are beginning to realize the complexity of the issue of environmental management and connecting processes, services and activities at the facility with environmental aspects and related environmental laws rules and regulations. A realization is beginning to set in that a facility wide and employee based process needs to be in place to manage this system if it is to be a continually ongoing, sustainable process.
- The addition of a DPW administrative staff person to the core team has been very helpful. This addition has added knowledge of divisional and departmental budgeting procedures and experience in writing requests for proposals and contracts for DPW with 3rd party consultants. The core team was very encouraged by participating in the conference and worked hard to have materials prepared for the presentation. The ISO project was also featured at a departmental wide employee in-service training session held in January 1999. This has raised the interests of other divisional managers about the project and ISO 14001 standard.
- Top management commitment to EMS development and ISO 14001 certification has helped move the project forward by demanding the development of clearly defined and obtainable goals, assignment of responsibilities and timelines for completion of tasks and deliverables. It has also put EMS development and certification objectives into Departmental and Divisional planning for goals and the budget for the upcoming fiscal year.

SECTION XI: LESSONS LEARNED

- Keep it simple. Try to design the EMS to fit into already existing management and documentation systems. Most of what is needed to develop an EMS already exists within the facility, it just needs to be pulled together in an organized and documentable system.
- Spread the responsibility for developing the EMS out into the organization. Let the staff know that they will be responsible for following procedures. Also, involve them in the

development process. Don't try to develop every component of the EMS before implementing it. As soon as something is developed, get it out into the organization.

- It is important that the top management and the core team understand the components of the EMS to be developed and have a clear understanding of what it will take to develop and implement it within the given fence line. Identification and commitment of resources, staff and timelines necessary to complete each EMS component early on is imperative.

SECTION XII: CONTACT INFORMATION

Wayne County Department of Environment
 Division of Public Works
 415 Clifford, 5th Floor
 Detroit MI. 48226
 Phone: (313) 224-3620
 Fax: (313) 224-7650
www.wcdoe.com

James A. Abron, Director
 Wyandotte Wastewater Treatment Facility
 797 Central Avenue
 Wyandotte, Michigan 48197
 Phone: (734) 285-5500
 Fax: (734) 285-5248

Contact: Lynn Renaud, EMS coordinator
 Wayne County Department of Environment
 Compliance and Public Affairs Division
 415 Clifford, 7th Floor
 Detroit, MI. 48226
 Phone: (734) 285-3363
 Fax: (734) 285-5248
 E-Mail: lrenaud@co.wayne.mi.us

Contact: Ron Fadoir, Environmental Specialist
 Phone: (313) 224-5087
 Fax: (313) 224-0045
 E-Mail: rfadoir1@co.wayne.mi.us

SECTION XIII: TOTAL COST/RESOURCE COMMITMENT DURING THIS PROJECT

The table below indicates the dollars spent by the Wayne County from August 1997 through July 1999 in planning, developing, and implementing the County's EMS. Travel costs represent costs for Wayne County personnel to attend meetings and workshops hosted by the U.S. Environmental Protection Agency during the pilot program. All figures are in nominal dollars.

Labor	Consultant	Travel	Materials
\$88,320	\$2,400	\$15,719	\$4,150

SECTION XIV: FUTURE EMS PLANS

The facility plans to move forward with implementation of their EMS. Once the components of the EMS are in place they plan to seek ISO 14001 Certification and registration. The Department will use the lessons learned from the Municipalities Pilot Project, and the Wyandotte Wastewater Treatment Facility certification process in evaluating future plans to develop an EMS on a divisional or possible departmental level.

CITY OF INDIANAPOLIS, INDIANA

SECTION I: BRIEF DESCRIPTION OF THE MUNICIPALITY

Indiana became a State in 1816. It's first capital was located at Corydon, in southwest Indiana. Soon thereafter, the State legislature recognized the importance of a more centralized location for government and in 1821, approved a new State Capital at the geographic center of the State. The new capital was named Indianapolis. Though Indianapolis was located near the center of the State and immediately adjacent to the White River, its development was curtailed because the river was not navigable year round. This serious impediment to growth and development disappeared with the advent of rail transportation beginning in the mid-1800s. In 1850 the City's population numbered just over 8,000.

Today, Indianapolis has capitalized on its central location as a major distribution center proximate to other major metropolitan centers including: Chicago, St. Louis, Cincinnati, Detroit, Cleveland, Columbus, and Louisville. Indianapolis has developed a diversified economy that includes manufacturing and heavy industry, with a growing reputation in finance, communication, high technology, and amateur athletics. With a population of 818,014 situated on 402 square miles, Indianapolis ranks as the 12th largest city in the nation. This, despite the fact that the City is not accessible by water. The metropolitan area encompasses nine counties with a population of approximately 1.5 million people.

The City of Indianapolis and Marion County currently operate under a consolidated city-county government known as "Unigov". As part of the consolidation, the boundaries of the City of Indianapolis became the same as the County with many public services combined. However, numerous local governments and taxing units remain independent within the boundaries of the City/County. The Mayor who is elected to an unlimited number of four-year terms heads the executive branch of "Unigov". Several appointed deputy mayors, department directors and division heads support the mayor.

Indianapolis operates under the "competitive government" philosophy of Mayor Stephen Goldsmith. Under that approach, the City has undertaken a concerted effort to identify the costs of its various activities, privatize activities that can more effectively be performed by the private sector and set measurable performance objectives for the activities retained by the City. A primary goal of the ISO pilot was to direct scarce City resources to activities that produced the best bang for the buck. Consequently, the ability of a project to reduce environmental impacts was considered along with cost reductions and efficiencies gained from the project in setting priorities.

SECTION II: "FENCELINE" DATA

Indianapolis chose to focus its pilot project on the operations garages within the Department of Public Works. The operations garages house a variety of functions and maintain the following operations: Traffic signals, street repair, buildings and grounds, sign manufacturing, snow removal, pavement striping, and road crack sealing. There are approximately 150 employees located at these facilities. After an initial assessment, the City selected drum management as its pilot project.

SECTION III: TOP MANAGEMENT FOR THIS PROJECT

Mayor - Establishes environmental policy that includes the development of an EMS system.

Mayor's Environmental Policy Advisor - Recommends environmental policy consistent with overall City policy and monitors progress in fulfilling the policy.

DPW Department Director - Authorizes use of the DPW Environmental Resources Division in assisting in the development of EMS projects. Authorizes the development of EMS activities within the DPW.

Relevant Department Director [other than DPW] - Authorizes the development of EMS activities within the department.

Relevant Department Operations Director - Prioritizes EMS activities within the department. Assures funding for EMS activities for the department and authorizes the work of the core team and implementation of the EMS.

SECTION IV: THE CORE TEAM

EMS Coordinator - The coordinator is housed in DPW's Environmental Resources Management Division. The coordinator solicits interest in the EMS program, develops core teams, and assists the core teams in the development and implementation of EMS projects. The coordinator tracks the overall progress of the EMS program.

Project Manager – The Project Manager reviews department operations with the Operations Manager and identifies environmental aspects and impacts of existing activities. The Project Manager recommends environmental objectives to Top Management which reduce operation costs or improve efficiency and safety while reducing environmental impacts. The Project Manager provides guidance and communicates with Operations Department during implementation of EMS, and tracks the progress and benefits of the EMS project.

Operations Manager - The Operations Manager review department operations with the Project Manager and identifies the environmental aspects and impacts of existing activities. The Operations Manager recommends environmental objectives to Top Management which reduce operation costs or improve efficiency while improving safety and reducing environmental impacts. The Operations Manager provides expertise and communicates with supervisors and union employees for the implementation of changes to existing operations.

SECTION V: WHY AN EMS - DRIVERS

Indianapolis believes the EMS will:

- Reduce environmental impacts in a cost-effective manner;
- Support the City's overall philosophy of constant improvements in efficient and effective service to its customers;
- Improve the working environment for its employees;
- Enhance the City's image as an environmentally responsible and competitive City; and,
- Provide the City with significant experience in making cost-effective environmental improvements that will place the City in a better position to argue against regulatory initiatives that are not cost effective.

SECTION VI: PILOT PROJECT OBJECTIVES AND TARGETS

Objective	Objective
Control and improve waste drum management	<ul style="list-style-type: none">Develop and implement drum management program by January 1, 1999

SECTION VII: STATUS OF THE EMS

The implementation and development of the EMS is pretty much complete. There are some areas that are lacking, such as emergency preparedness, with others, such as auditing and management review, that have yet to be addressed. The Environmental Management Program (EMP) we set out to develop for management of waste drums has been completely developed and is about 90% implemented.

SECTION VIII: KEYS TO SUCCESS

- Active support by upper management is the major key to success of the EMS. Without it the project cannot be fully developed. Management support should include not just the “okay” to do the program, but an active role and accountability of those implementing to those in management.
- Clear measures of success are needed to sell the value of the program to potential participants.
- Clear definition of responsibilities for various participants in the EMS effort is needed.
- The Core Team should include a respected representative of the employees (e.g. union) most affected by the proposed changes. This will help expedite implementation of the EMS and improve communications between management and those employees.
- Maintenance of momentum is critical. Start with easily achievable goals that can provide clear measures of success. Celebrate goals achieved. This is especially important at the beginning of the EMS process since measurable progress seems slow if not non-existent. As goals are achieved and celebrated, the enthusiasm, cooperation, and awareness of others, especially those who are involved in implementation but not on the Core Team, is critical to the success of the program. Once momentum is lost it is difficult to regain interest.

SECTION IX: HURDLES

- The initial assessment of an operation can produce an apparently overwhelming number of issues. The discipline of the EMS system helps keep the issues under control and prioritized. Our initial assessment of the operations building turned up more questions than answers. Chemical hazard communication, storage, handling, pollution prevention and disposal have numerous facets. The ERMD team has specialists in each of these areas and dedicated time not only to assembling information but distributing information, as needed, to the training and operations divisions.
- An inability to quantify the benefits of EMS projects can significantly reduce enthusiasm for the system. The ability to identify both a reduction in environmental impacts and either cost reductions or increased efficiencies is essential to promoting the expansion of the EMS to other departments and projects.
- Competing priorities sometimes result in the redirection of personnel from EMS projects to other projects. As we are able to identify the benefits of the EMS more clearly, we anticipate

that the EMS program will become a higher priority, and the redirection of employees will be substantially reduced.

- Effort should be made to avoid reassigning staff critical to the development of the program, especially during the program's formative stages.
- Failure to clearly define roles at the outset of the EMS process can reduce the effectiveness of the program effort.

SECTION X: BENEFITS

- The EMS provided a mechanism for supervisors, workers and management to express the need for a unified system for the inventory, management and disposal of chemicals.
- The EMS provided a mechanism for shared awareness by environmental staff and operations regarding activities that have environmental aspects.
- The EMS resulted in the development of a New Products Committee, through which Union representatives from each garage meet on a monthly basis to discuss environmental and safety issues with the Core Team. The monthly meetings have resulted in the replacement of existing chemicals with chemicals with less environmental impact. The Committee has also initiated equipment changes that more effectively protect workers.
- The EMS has improved communications and the relationship between operations management and the union line workers.
- The EMS resulted in the implementation of a drum management program. That program:
 - Reduces waste;
 - Greatly reduces the risk of spills; and,
 - Saves disposal costs.

SECTION XI: LESSONS LEARNED

- Obtain both the philosophical, personnel and monetary commitment to the program from upper management up front.
- Recognize that the EMS can be used to promote worker safety as well as accomplish a reduction of environmental impacts.
- Select small projects initially, then expand to more complex issues.
- Select initial projects that will produce easily quantifiable benefits in terms of reduction of environmental impact, efficiencies gained or costs reduced.
- Clearly define the roles of upper management and the core team members in developing and implementing the EMS.
- Ensure the inclusion, on the Core Team, of a trusted representative of the workers most affected by the proposed changes.
- Avoid reassignment of key EMS development personnel especially during the inception of the EMS.
- Be flexible in applying the ISO 14000 guidelines to your organization. If the fit is not perfect, use those elements of the program that work for your situation.
- Solicit a third party cheerleader for your EMS efforts. The third party could represent the local Chamber of Commerce, environmental groups, neighborhoods or other entities interested in promoting environmentally responsible actions.

SECTION XII: CONTACT INFORMATION

Amy McClure
City of Indianapolis
DPW – ERMD
2700 South Belmont Avenue
Indianapolis, IN 46221
(317) 327-2470

Kendall Coad
City of Indianapolis
DPW-ERMD
2700 South Belmont Avenue
Indianapolis, IN 46221
(317) 327-2175

SECTION XIII: TOTAL COST/RESOURCE COMMITMENT DURING THIS PROJECT

The table below indicates the dollars spent by the City of Indianapolis from August 1997 through July 1999 in planning, developing, and implementing the City's EMS. Travel costs represent costs for City of Indianapolis personnel to attend meetings and workshops hosted by the U.S. Environmental Protection Agency during the pilot program. All figures are in nominal dollars.

Labor	Consultant	Travel	Materials
\$39,000	\$9,700	\$6,000	\$0

SECTION XIV: FUTURE EMS PLANS

Our future EMS plans include finishing up what remains to be done on the first aspect we decided to tackle, which is waste drum management. We are developing a plan to look at a second aspect within our organization that needs to be addressed, the sign manufacturing shop. We will use our success in developing the drum management system to expand the program to additional projects and departments. We have designed our documentation system so that any department within the city can take what we have done and mimic it to develop its own EMS. The future of our program depends, to a large degree, on the interest of the next administration in promoting the program.

LANSING BOARD OF WATER & LIGHT LANSING, MICHIGAN

SECTION I: BRIEF DESCRIPTION OF THE MUNICIPALITY

Lansing is located in the south central part of Michigan, 90 miles west of Detroit and is the state's capital. The City has a population of 127,321 according to the 1990 Census and a per capita income of \$14,043. The Lansing economy is supported by the State of Michigan, General Motors, and Michigan State University. These three employers, however, account for only about twenty percent of the area's employment. Lansing is an important governmental center as Michigan's Capital. It is also the headquarters of General Motors' small car division. A diverse group of other industries including, insurance companies, trade associations, schools, and banks round out the list of major employers.

Lansing operates under the mayor-council form of municipal government. The Mayor is elected by the City at large and serves for a four-year term. The City Council consists of eight members, four elected at large and one from each of the four wards. Lansing Board of Water & Light (LBWL) is an administrative board, delegated executive and policy making responsibilities by the City of Lansing, Michigan. LBWL has full and exclusive management of the water, heat, steam and electrical services of the City of Lansing and is responsible to the mayor, City Council, and the residents of Lansing for providing these services.

LBWL is a municipal utility, owned by the citizens of Lansing, Michigan. Its roots go back to 1885, when Lansing citizens approved a \$100,000 bond issue to build a water system to provide for drinking water and fire protection. Electricity was added to its list of utility services in 1892, and steam heat in 1919. Owned and operated by hometown people, LBWL has grown to become the third largest electric utility in the state, the largest municipally owned utility in Michigan and a major employer in the Lansing area.

SECTION II: "FENCELINE" DATA

LBWL chose Erickson Station as its fenceline. Erickson Station is a coal burning electric generating plant. It houses one steam electric generating unit. This unit generates 165 megawatts, 1800-psi throttle pressure and 1,100,00 lb. of steam per hour. Make up water is supplied to this unit from a demineralizer. Cooling water is supplied to the plant from a closed cooling tower circuit with its blowdown being returned to the Grand River. Cooling tower make-up is taken in from the Grand River.

Erickson Station was chosen as the fenceline because it is the newest LBWL electric generating facility. The age and location of the facility makes it the easiest of the LBWL facilities for initiating an EMS pilot project. LBWL has 730 employees, 35 of which work at Erickson Station.

SECTION III: TOP MANAGEMENT FOR THIS PROJECT

Manager – Electric Production

Manager – Environmental Services Department

SECTION IV: THE CORE TEAM

The Core Team consisted of seven members. The Team Leader was an Environmental Analyst from the Environmental Services Department. The remaining members were 1 Environmental Analyst, 2 Environmental Engineers, Erickson Station Chemist, Electric Water Quality Supervisor, and Fuel Quality Analyst.

SECTION V: WHY AN EMS: DRIVERS

This project was viewed as an opportunity to improve internal and external communication and to organize, streamline, and consistently manage environmental issues and regulatory responsibilities.

SECTION VI: OBJECTIVES AND TARGETS

Draft Objectives and Targets for operating the circulating and cooling water system.

Objective	Target
Safe Handling and control of all oil and chemical spills	<ul style="list-style-type: none">• No chemical spills or release• No equipment oil leaks• No chemical related employee injuries
Operate the cooling water system to optimize Heat Rate (BTU coal/megawatts produced)	<ul style="list-style-type: none">• Maintain equipment and chemical balance to prevent corrosion, scale and biological deposits• Comply with all discharge permits

SECTION VII: STATUS OF THE EMS

Formal adoption of the ISO 14000 EMS is on hold. Components of the system will be used as issues and opportunities present themselves.

SECTION VIII: KEYS TO SUCCESS

- Highly skilled technical core team.
- Ability of the core team to work as a group, providing positive support in all problem-solving activities.

SECTION IX: HURDLES

- The organization was undergoing restructuring during the same time as the EMS project. There were major changes in organizational roles and personnel, and limited resources for design and implementation.
- It is very difficult to overcome an organizational attitude and culture that anything not directly tied to production is important.
- Difficulty in scheduling meetings where everyone is available.

- TIME, TIME, TIME!! The team is committed to the EMS as a benefit to our organization. However, all members are all working on multiple priorities, and since starting this project nothing was removed from their list.
- A possible problem is that our team really wanted to do things as a group. The team leader usually developed draft documents, but the group was more comfortable (and formally agreed on this format) with all edits being reviewed in a meeting, rather than as homework sent back to the team leader. As long as we could maintain some degree of efficiency in this it was not a problem. Because we were all learning the process together we felt this was the best approach.

SECTION X: BENEFITS

- An understanding of the ISO 14001 system.
- Process analysis and mapping. As we worked through the aspect identification and impact analysis we created facility process block diagrams. These diagrams have potential for training and operational problem solving. One is already in use for a regulatory permit issue. The facility block diagrams have been used in several situations outside the scope of the ISO 14001 EMS development. These drawings will be a valuable resource when identifying process changes. These will probably continue to be used and maintained even if the EMS is not formally adopted.

SECTION XI: LESSONS LEARNED

- We needed to have more diverse participation on the core team. There were no active participants from management or plant operations. All team members were from support departments.
- At the beginning a detailed project schedule is needed, with task lists, participant responsibilities, resource identification, and time line for completion. This needs to be agreed upon by management and the participants at the start. Meeting times must be scheduled with appropriate release time for participation. A project of this scope, including participants from several work groups, needs to be prioritized with existing responsibilities, not just added to them.
- From the very start management needs to understand and commit to tangible participation and endorsement of EMS elements. Management is in the best position to become the “champion” of the project. Management must be committed to participate at each step according the ISO 14001 EMS elements
- As each stage of the EMS is developed it should be immediately implemented with the appropriate management review and employee training. Waiting until the end does not provide the important feed back needed to make continual improvements. This will give immediate feed back to the core team and management regarding employee acceptance, training requirements, EMS benefits, and environmental and operational issues.

SECTION XII: CONTACT INFORMATION

Irene Armock – Environmental Analyst
P.O. Box 13007
Lansing Board of Water & Light
Lansing, Mich.

Phone – 517- 371-6385
E-mail – irene@LBWL.com

SECTION XIII: TOTAL COST/RESOURCE COMMITMENT DURING THIS PROJECT

The table below indicates the dollars spent by the LBWL from August 1997 through July 1999 in planning, developing, and implementing LBWL’s EMS. Travel costs represent costs for LBWL personnel to attend meetings and workshops hosted by the U.S. Environmental Protection Agency during the pilot program. All figures are in nominal dollars.

Labor	Consultant	Travel	Materials
\$53,500	\$0	\$2,100	\$0

SECTION XIV: FUTURE EMS PLANS

Unsure at this point

Appendix C



CITY OF INDIANAPOLIS ENVIRONMENTAL POLICY

The City's environmental policy will enhance its vision of "safe streets, strong neighborhoods and a thriving economy". It is the City's policy to perform its activities in a responsible manner to protect human health and the environment.

Compliance. The City is committed to meet or exceed applicable regulatory and legal requirements.

Prevention. The City will practice waste minimization and pollution prevention where practical and cost-effective. The City will establish objectives and programs for the reduction or control of wastes and energy use, and maintain procedures for promptly and effectively dealing with environmental emergencies.


Continuous Improvement: Environmental Management System. The City is committed to the continuous improvement of its efforts to protect human health and the environment through the development of an environmental management system [EMS] to:

- identify activities that pose the greatest potential for impact on human health or the environment,
- establish goals for improving environmental performance for those activities,
- develop efficient and effective strategies and work practices to achieve those goals, and
- periodically assess progress in meeting those goals.

The environmental management system's goals and implementation strategies are based on: potential impact on human health and the environment, anticipated costs, anticipated benefits, and the overall objectives of the City and its communities.

Communication. The City will communicate its policy to the public, city employees and city contractors. The City will strive to inform the public of responsible actions the public can take with regard to the protection of human health and the environment, and involve interested persons in the identification and resolution of environmental issues.


Mayor Stephen Goldsmith


Date

Environmental Policy		
Londonderry Department of Public Works	Document Status: Final	Date: 8/10/98
Document #: EP-DPW-1	Revision:	






Town of Londonderry Public Works Department Environmental Policy

The Londonderry Public Works Department is committed to lessening its environmental impact on the community whenever possible by implementing and continuously improving environmental management practices.

The Department pro-actively promotes environmental leadership through the following environmental stewardship principles:

Environmental Laws and Regulations - the department is committed to complying with relevant Federal, State and local environmental regulations, standards and laws.

Pollution Prevention - the department seeks to prevent pollution of air, water, and/or land by minimizing the use of hazardous materials and release of potentially harmful contaminants by striving to:

-  improve materials management
-  reduce quantities of solid waste
-  improve wastewater quality

Improvement - environmental practices are continuously improved by setting and reviewing environmental objectives and targets.

Document Control Number EM01000	Original Date 10/12/98	Date last revised	Revised by:
Document Titled: Environmental Policy			When Printed Approximately Pages

Environmental Policy

Scottsdale's Vision Statement includes the expectation that "... on the way to the year 2000, our employees will be recognized as environmentally sensitive."

The City of Scottsdale is committed to continuously improve citywide environmental management practices and to become a model of environmental performance. The City empowers each individual employee to proactively promote environmental leadership through the following four environmental stewardship principles:

Conservation - to actively explore, create, and communicate new ways to prevent pollution and to preserve natural resources.

Co-operation - to build partnerships, inside and outside the organization, to sustain and enhance our environment.

Environmental Compliance and Risk Reduction - to ensure that technologies, facilities, processes and operating procedures meet or exceed environmental, health, and safety requirements and other requirements that the City has committed to meet.

Restoration - to promptly and responsibly correct conditions which hinder sustainable environments.

In order to assist in the promotion of these stewardship principles, the city will maintain an environmental management system, including environmental objectives and targets consistent with this policy that are measurable, meaningful, and understandable. This policy, including progress toward the achievement of the objectives and targets, will be communicated to our employees and to our citizens and other stakeholders.

A healthy and sustainable environment is important to our citizens, our economy, and our future. The City of Scottsdale will strive to be a model of environmental performance.

NYCT - Capital Program Management Environmental Policy

Environmental Management System



Moving Towards Environmental Excellence

370 Jay Street, 10th Floor
Brooklyn, NY 11201

Capital Program Management (CPM) is committed to the safe design, management, construction and renovation of NYC Transit Authority subway, bus and train facilities. The safety of all staff, contractors, passengers and the public, and protection of the environment, are among our highest priorities.

In conformance with NYCT's Environmental Management Policy and Program, CPM will establish, implement and maintain an Environmental Management System (EMS) that conforms with the ISO 14001 EMS Standard and provides a disciplined framework within which we will fulfill our environmental responsibilities and continually improve our environmental performance.

In this endeavor, we will:

- ◆ Consider the actual and potential environmental aspects and impacts of our operations and activities at all stages of our projects.
- ◆ Set EMS objectives and targets, and periodically review them in order to continually improve our EMS and environmental performance.
- ◆ Establish department environmental procedures and programs, including those fostering the prevention of pollution.
- ◆ Adhere to all applicable environmental laws and regulations, as well as to our voluntary environmental commitments.
- ◆ Use our best efforts to minimize, and eliminate where practicable, significant adverse environmental impacts of our projects on our employees, contractor personnel, passengers and the communities in which projects are located.
- ◆ Document, implement and maintain our EMS and communicate it to all employees.

This environmental policy shall be available to the public.

Signed:
Date: January 20 1999


Mysore Nagaraja
Senior VP & Chief Engineer

Fall '98

Londonderry Household Hazardous Waste Collection
Participant Exit Survey

1. How many households do you represent?

One Two Three Four More than four

2. Do you have additional hazardous materials in your home which you do not know how to dispose of properly? yes no

If yes, what are they? asbestos motor oil

_____ other

3. How often do you need to dispose of hazardous waste?

Monthly quarterly twice a year annually less than once a year

4. How did you hear about this collection?

Newsletter newspaper TV
 word of mouth Town sign Fire Dept.

5. Did you bring any of the following household hazardous waste?

Paint solvent or thinner household cleaners
 household batteries pesticides herbicides

6. Have you attended a household hazardous waste collection before?

Yes No

7. Are you aware that the Londonderry Public Works Department is implementing an EMS?

Yes No

8. Which of the following Public Works activities are you most concerned with having an environmental impact on the Town?


Salt/sanding Trash disposal sewage treatment increased Town development

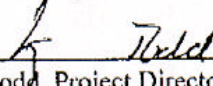
burning brush Access to recycling hazardous spills environmental education

other _____

Londonderry Internal Audit Worksheet	
Department of Public Works Division: Highway Garage	Audit Period: Implementation period
Document #: IA1-HG	Audit Date: July 2, 1999

CLAUSE	YES/NO	COMMENTS	Corrective action required? YES/NO
1. ENVIRONMENTAL POLICY			
1.1. is the policy appropriate to the nature, scale and environmental impacts of this division of the DPW's activities, products or services?	Yes		No
1.2. does it include a commitment to continual improvement and prevention of pollution?	Yes		No
1.3 does it include a commitment to comply with the relevant environmental legislation and regulations, and with other requirements to which the organization subscribes?	Yes		No
1.4 does it provide the framework for setting and reviewing environmental objectives and targets?	Yes		No
1.4 has there been training for employees on the environmental policy?	Yes	Documented at Town Offices	No
1.6 are all employees of this division aware of the environmental policy?	Yes	Not posted but are aware	Will Post
1.7 are the employees aware of the content of the environmental policy?	Yes		No
1.8 has the division implemented environmental programs to promote the environmental policy?	Yes		No
1.9 is it available to the public?	N/A	Building not open to the public	No
2.0 is this information up-to-date?	Yes		No

Reviewed by  Date 7-2-99
Troy Brown, Environmental Management Rep.

Reviewed by  Date 7/2/99
Liz Todd, Project Director

Significant Environmental Aspect Assessment Matrix

Activity, Product or Service	Environmental Aspect/ Impact	Severity	Frequency or Probability	Legal/Regulatory Implications	Public Image	Total
THE RATING SYSTEM FOR ACTIVITY, PRODUCT, AND SERVICE BASED FOR THE TABLE						
Not Applicable	Low	Moderate	High	Very High		
0	1	2	3	4		

Appendix D

**EMS ELEMENTS IMPLEMENTED IN PARTICIPANT FENCELINES
(21 Months)**

Participant	POLICY			PLANNING				IMPLEMENTATION AND OPERATION				CHECKING AND CORRECTIVE ACTION					
	Policy	Sig. Aspect	Legal Req.	O&T	EMPs	Struc./ Resp.	Training	Comm	Doc.	Doc. Control	Op Cont	Emer Prep	Monit Meas	Corr Prev	Record	EMS audit	Mgmt Rev.
A	X	X	X	X					X	X					X		
B	X	X	X	X					X	X					X		
C	X	X	X	X	X	X			X	X					X		
D	X	X	X	X	X	X	X		X	X					X		
E	X	X	X	X	X	X	X		X	X	X	X			X		
F	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
G	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
I	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Appendix E



MEMORANDUM OF UNDERSTANDING

THIS Memorandum of Understanding (MOU), effective as of the date last signed below by and between the Global Environment & Technology Foundation (GETF), a non-profit foundation with offices located at 7010 Little River Turnpike, Suite 300, Annandale, Virginia 22003-9998, and The Town of Londonderry, with offices located at 50 Nashua Road (hereinafter the Parties);

WHEREAS, GETF has received a grant from the U.S. EPA's Office of Water and Office of Enforcement and Compliance to assist a group of municipalities and counties in their implementation of an ISO 14000 EMS;

WHEREAS, Londonderry has been selected through a review process to participate in this implementation project;

WHEREAS, Londonderry wishes to pursue ISO 14000 EMS implementation; and

WHEREAS, GETF proposes to provide services as outlined in the Scope of Work, to Londonderry in pursuit of its ISO 14000 EMS implementation initiative. The specified services will be provided at no cost to the facility/organization as part of a pilot project under grant X 825557-01-0 between the U.S. Environmental Protection Agency, Office of Water and Office of Enforcement and Compliance, and the Global Environment & Technology Foundation. As consideration for the provision of these services, Londonderry shall meet the obligations as outlined below at their choice of at least one facility/organization/organization;

NOW, THEREFORE, in consideration of the promises hereinafter contained, the Parties agree to the following:

1. As currently structured, the EPA ISO 14000 pilot project will continue through the end of September 1999.
2. GETF agrees to provide trainers at a central location for four quarterly training sessions each year of the project, training materials, implementation tools, and coaching support for the tasks outlined in the Scope of Work (hereinafter referred to as Attachment A) incorporated herein by reference, to facilitate the facility/organization's readiness for a registration audit. The Parties clearly understand that the municipality will facilitate, oversee, and be responsible for the development and implementation of the ISO 14001 at the facility/organization, according to a schedule mutually agreed upon by the parties. Under this Agreement, GETF is not responsible for providing on site training, for actually writing the facility/organization's policies, procedures, etc. or for conducting and on-site gap analysis or on-site internal audits, except as part of a separate agreement with the facility/organization.
3. Londonderry agrees to determine the time schedule and allocate necessary staff resources for completing each of the tasks outlined in the attached Scope of Work. Londonderry shall also be responsible for developing the internal procedures necessary for ISO 14000 implementation. Londonderry further agrees to complete an EMS Tracking Sheet on a monthly basis and provide it to GETF by the first Tuesday of each month for the preceding month.

4. Londonderry agrees to collect data as agreed upon by the Parties concerning the development, implementation, and operation of the ISO 14001 EMS. This data may be collected into case studies and used in a common database, which will be shared with GETF, EPA, and other project participants.
5. If at any point during the period of this MOU, GETF determines at its sole discretion that Londonderry is not meeting its obligations hereunder, GETF shall have the right to withdraw its services under this MOU. In such case, GETF shall not be liable to Londonderry for any reason whatsoever.
6. The parties hereto acknowledge and agree that during the course of this Agreement they shall exchange confidential and proprietary technical, business, and training information (“Confidential Information”), if applicable. Neither Party nor their subsidiaries, divisions, employees, agents, representatives, independent contractors or other persons or organizations over which they have control will at any time during the term of this Agreement directly or indirectly disclose such Confidential Information to any third parties for any purposes without prior written agreement of the other Party.

Confidential Information is defined as, but not limited to, performance, sales, financial, contractual and special marketing information, personnel, ideas, technical data and concepts originated by the disclosing Party, only if such information is conspicuously designated as “Confidential”; (i) in writing, if communicated in writing, or (ii) confirmed in writing within seven (7) calendar days of disclosure if disclosed orally; and provided further that the Confidential Information shall not include information that: 1) is now or subsequently becomes generally available to the public through no fault or breach on the part of Recipient; 2) Recipient can demonstrate to have had rightfully in its possession prior to disclosure to Recipient by Disclose; 3) is independently developed by Recipient without the use of any Confidential Information; 4) Recipient rightfully obtains from a third party who has the right to transfer or disclose it; 5) is disclosed three years from receipt of the information; or 6) is disclosed with the written approval of the other party.

Recipient agrees to use reasonable care, but in no event no less than the same degree of care that it uses to protect its own confidential and proprietary information of similar importance, to prevent the unauthorized use, disclosure, publication, reproduction or dissemination of Confidential Information by itself or by their subsidiaries, divisions, employees, agents, representatives, independent contractors or other persons or organizations over which they have control at any time during the term of this Agreement. Recipient agrees to use Disclose’s Confidential Information for sole purpose of conducting activities under this agreement. Recipient agrees not to use Confidential Information if required by any judicial or government request, requirement or order; provided that Recipient will take reasonable steps to give Disclose sufficient prior notice in order to contest such request, requirement, or order by notifying Disclose of such request.

Neither Party shall be liable for the inadvertent or accidental disclosure of Confidential Information if such disclosure occurs despite the exercise of the same degree of care as such party normally takes to preserve its own data or information.

7. Nothing contained in this MOU shall, by express grant, implication, estoppel or otherwise, create in either party any right, title, interest, or license in or to the inventions, patents, technical data, computer software, or software documentation of the other party.

8. Nothing contained in this MOU shall grant to either party the right to make commitments of any kind for or on behalf of any other party without the prior written consent of that party.

9. This agreement shall be governed and construed in accordance with the laws of the State of Virginia.

10. This MOU may not be assigned or otherwise transferred by either party in whole or in part without the express prior written consent of the other party, which consent shall not unreasonably be withheld. This consent of the other party, shall not apply in the event either party shall change its corporate name or merge with another corporation. This MOU shall benefit and be binding upon the successors and assigns of the parties hereto.


11. For purposes of this MOU, the respective points of contact shall be:

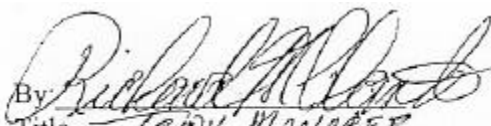
For GETF: Lynne Rasmussen Executive Director, Environment Management Global Environmental & Technology Foundation 7010 Little River Turnpike, Suite 300 Annandale, VA 22003 Ph: 703-750-6401 Fx: 703-750-5438 name@getf.org	For <u>Londonderry</u> : <u>Richard Plante</u> <u>Town Manager</u> <u>Londonderry Town Offices</u> <u>50 Nashua Road, Suite 100</u> <u>Londonderry, NH 3053</u> _____ _____ _____
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IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed as of the effective date last written below.

Global Environment &
Technology Foundation

(Municipality)

By: 
 Title: Executive Director
 Date: 9/17/97

By: 
 Title: TOWN MANAGER
 Date: SEPT 9, 1997

Summary of Participants Responsibilities

The Scope of the Work for this project includes thirteen tasks designed to develop, implement, collect, information, and report on an ISO 14001 EMS at a facility/organization. The Municipality/County is responsible for selecting the facility/orgnaization for this initiative and taking all reasonable actions to ensure that each of these tasks is completed at the facility/organization.

1. Communicating management commitment to implementing an ISO 14001 EMS across the organization.
2. Providing ISO 14001 training for all relevant personnel that are to be involved in developing and implementing the EMS at that facility/organization. This can include but is not limited to:
 - Introduction to the ISO 14000 family of environmental management standards
 - Comprehensive overview of ISO 14001 elements and requirements
 - Comprehensive overview of implementation issues
 - Review of relevant ISO 14001 implementation tools (e.g. Gap analysis, implementation schedules, environmental aspects assessments, training logs, document control procedures, computer based training modules and CD-ROMs)
 - Overview of internal auditing and procedures
3. Committing to develop, implement, support and report on the ISO 14001 EMS
 - Select and EMS management representative at the facility/organization
 - Allocate resources and develop a schedule
 - Develop job descriptions for management representatives
 - Use agreed on tracking mechanisms for the project
4. Selecting and EMS core team and defining roles, responsibilities and authorities for the team members
5. Conducting a gap analysis at the facility/organization
6. Developing an environmental policy at the facility/organization that conforms to the requirements of the ISO 14001 EMS.
7. Determine external criteria(legal and other requirements)

8. Planning and conducting an employee awareness program and kick off meeting

9. Establishing internal criteria
 - Describe workflow processes of each functional unit in the facility/organization
 - Identify environmental aspects and impacts of products, activities, and services in each functional unit
 - Determine significant impacts
 - Identify operations and activities associated with significant environmental aspects and specify controls for these.
 - List objectives and targets for each significant aspect
 - Develop environmental management programs
 - Assign responsibility for writing EMS procedures and work instructions
 - List critical documents, records, and document control procedures for each functional unit
 - Establish strong internal and external communication processes
 - Monitor and measure activities as described by the ISO 14001 Standard

10. Developing an EMS that conforms to the requirements of the ISO 14001 EMS
 - Train development teams
 - Document the EMS
 - Write the internal audit plan
 - Select and train internal auditors
 - Train employees

11. Implementing the plan
 - Monitor, measure, track, record, adjust, and verify the EMS
 - Update employees as needed
 - Perform management reviews
 - Conduct internal audits
 - Make corrections and improvements
 - Report on progress

12. Tracking progress and supplying data as agreed upon by the Parties in ISO 14001 EMS Implementation Initiative concerning the development, implementation, operation, and environmental performance of the ISO 14001 EMS at the facility/organization

13. Ensuring continual improvement of the EMS

The parties agree to make all reasonable efforts to complete these tasks within the two-year timeframe established for this project. The parties also understand that the completion of these thirteen tasks does not automatically indicate that the facility/organization will be successful if it decides to pursue ISO 14001 certification.