



NBP EMS 101 Workshop

Summary Report

Prepared by



May 22-23, 2007

Murfreesboro, TN

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INTRODUCTION

The National Biosolids Partnership (NBP) is a nonprofit alliance formed in 1997 by the National Association of Clean Water Agencies (NACWA), Water Environment Federation (WEF) and the U.S. Environmental Protection Agency (USEPA). The NBP is committed to developing and advancing environmentally sound and sustainable biosolids management practices that go beyond regulatory compliance. The NBP promotes public participation in biosolids programs to enhance the credibility and public acceptance of beneficial reuse of biosolids.

In 2007, the NBP welcomed a group of new utilities into the Environmental Management System (EMS) program. The University of Florida Center for Training, Research and Education (UF/TREEO) in conjunction with the NBP conducted a two-day Environmental Management Systems (EMS) workshop in Murfreesboro, Tennessee on May 22-23, 2007. This workshop was an opportunity for these agencies to interact together and continue the process of developing and implementing an EMS. This workshop (EMS 101 Workshop) is the first in a three course series developed by the NBP.

Thanks are extended to:

- CH2M Hill for preparing the initial workshop materials.
- UF/TREEO and Ross & Associates for updating the materials.

This report is intended to highlight some key topics covered during the workshop and serve as a high-level summary for those either unable to attend or interested in reviewing some of the workshop's key learning objectives. It is not intended to substitute for attending nor does it present all the material that was covered in the workshop.

There were 12 utilities represented by 27 attendees. The list of attendees is shown in Appendix A, page 14.

The instructional team consisted of Peter Machno, Project Manager NBP EMS Project, William T. Engel, Director, UF/TREEO and Douglas Dean, Adjunct Professor UF/TREEO and President Matrix Compliance Services.

There were two "Meet & Greet" meetings to kick off the NBP EMS Program. These were held on 3/20/07 in Manchester, NH and Nashville, TN prior to the May course in Murfreesboro, TN. These two sessions were designed to assist in streamlining the entire series of training programs.

The NBP now has a series of three (3) courses. Following these "Meet & Greet" sessions, the participants were given the following assignments:

- H.W. Assignment Sheet #1 (see Appendix B, page 16)
- Reading Assignments
 1. Small Agency Manual
 2. NBP EMS Guidance Manual, Elements 1-5, 10, 12, 13

The agenda for the workshop is shown in Appendix C, page 17. The workshop was designed to have attendee participation. This was accomplished by breakout sessions, guided discussions and question and answer opportunities. The workshop began with the key topics of building blocks, continual improvement and using the plan-do-check-act cycle of total quality management. Also discussed, were the pressures facing many biosolids operations, such as reduced land application sites and poor public perception of biosolids, and how implementing an EMS will help a utility address these issues.

To improve the implementation and public acceptance of environmentally sound biosolids management practices, the NBP has developed a voluntary EMS certification program for the biosolids industry.



The 16 agencies that are currently certified include:*

- East Bay Municipal Utilities District, California
- Encino WW Authority, California
- Orange County Sanitation District, California
- City of Los Angeles Department of Public Works, California
- Metro WW Reclamation, Colorado
- Kent County Public Works Department, Delaware
- District of Columbia Water and Sewer Authority, Washington, DC
- Madison Metropolitan Sewerage District, Wisconsin
- Columbus Water Works, Georgia
- City of Lawrence Department of Utilities, Kansas
- City of Grand Rapids, Michigan
- City of Raleigh Public Utilities Department, North Carolina
- Butler County Department of Environmental Services, Ohio
- City of Albany, Oregon
- City of Fort Worth Water District, Texas
- King County Division of Wastewater Treatment, Washington

*see www.biosolids.org for details of each facility's EMS

During the workshop, Jerry Stewart from the City of Chattanooga participated as a guest speaker. He gave us an update on the status of their development of their EMS. He presented real life experiences, benefits and barriers as they proceed to implement their EMS program.

OBJECTIVES AND EXPECTATIONS

The instructional team developed the following objectives for the workshop. The intent was for the participants to be able to accomplish these objectives over the two-day training period.

- Identify NBP minimum conformance requirements for Elements 1-5, 10, 12, and 13
- Provide guidance to the core team and upper management in the development of the NBP EMS and policy
- Identify critical control points, operational controls, and environmental impacts
- Identify legal and other requirements
- Determine how to set goals and objectives for an EMS
- Understand measuring and monitoring requirements
- Develop EMS Manual, documentation, and document control procedures

On day one, the team solicited input from the participants on their expectations of the workshop.

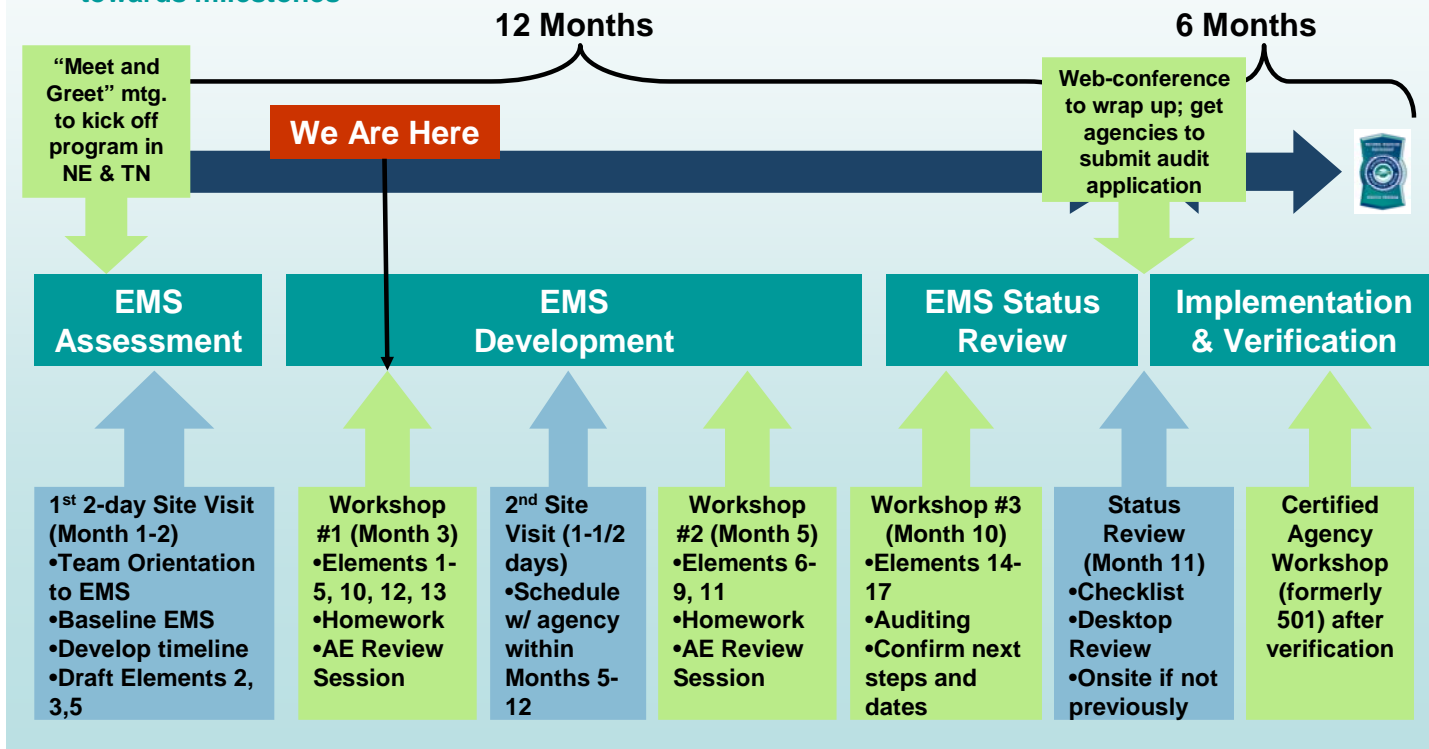
- Better understanding of EMS
- Looking for guidance on putting EMS together
- Information on Communication Internally & Externally
- Understand the framework for the 17 elements
- Learn how the EMS can reduce compliance issues
- Learn how to implement “proactive” work habits

The class expectations and workshop objectives were a good match increasing the chances of a successful exchange of information.

The EMS Development Process shown as a timeline is on page 6. This gives the schedule for the 18 Month program.

The EMS Development Process

Monthly Agency/Contractor Calls (Months 1-12); Status Calls w/ Sr. Mgmt in Months 4 and 9 to confirm commitment and progress towards milestones



NBP EMS OUTCOMES

An EMS is a management framework for reducing environmental impacts and improving organizational performance over time. Implementing an EMS is voluntary; therefore, the EMS framework can be adapted to support the organization's needs, priorities, and circumstances. The NBP EMS framework supports continual improvement in four key outcome areas that will help an organization foster public acceptance.

- Regulatory compliance
- Quality management practices
- Improved relations with interested parties
- Environmental performance

The EMS framework is based on the “plan-do-check-act” continual improvement cycle of total quality management (TQM) and involves a set of planning activities, procedures, performance monitoring, and review to allow an organization to improve business processes over time.

NBP FRAMEWORK AND THE 17 ELEMENTS

The NBP developed a framework that consists of 17 building blocks, or elements (see page 8), for developing and implementing an EMS. Taken together, these elements provide a structure for helping the organization:

- Establish guiding principles for your biosolids management program
- Set goals for continual improvement
- Implement procedures for ensuring consistent product and service quality
- Engage stakeholders to demonstrate that your program is committed to protecting the environment and carrying out your stated mission
- Correct and prevent problems
- Measure and report performance improvements, and act on lessons learned and opportunities for additional improvements

There Are 17 Elements in an EMS

5 Major Groupings – correspond to P-D-C-A

- **Overview and Policy**
- **Planning**
- **Implementation**
- **Measurement and Corrective Action**
- **Management Review**

EMS Elements

- Overview and Policy
 - 1 — EMS Manual
 - 2 — Biosolids Management Policy
- Planning
 - 3 — Critical Control Points
 - 4 — Legal and Other Requirements
 - 5 — Goals and Objectives
 - 6 — Public Participation and Planning
- Implementation
 - 7 — Roles and Responsibilities
 - 8 — Training
 - 9 — Communications
 - 10 — Operational Control of Critical Control Points
 - 11 — Emergency Preparedness and Response
 - 12 — EMS Documentation and Document Control
- Measurement and Corrective Action
 - 13 — Monitoring and Measurement
 - 14 — Nonconformances: Preventive and Corrective Action
 - 15 — Periodic Biosolids Management Program Performance Report
 - 16 — Internal EMS Audit
- Management Review
 - 17 — Periodic Management Review of Performance

The 17 elements, shown on page 8, are grouped into five categories.

- Overview and Policy
- Planning
- Implementation
- Measurement and Corrective Action
- Management Review

THE FOUR OUTCOMES

The NBP EMS framework is specifically tailored to support the needs and priorities of wastewater utilities and biosolids programs. The NBP EMS is designed to support improvements in four key areas:

- Quality management practices
- Regulatory compliance
- Improved relations with interested parties
- Environmental performance

Participants in the NBP EMS program will be evaluated on whether their EMS actually supports real performance improvements in these areas. In other words, outcomes matter. The workshop covered the four outcomes that the EMS promotes. It also emphasized the importance of focusing on the biosolids value chain when developing an EMS.

Product Quality: Identify and Manage Your Biosolids Value Chain



- **Think of biosolids as a product, not a by-product**
- **Manage key activities that impact biosolids quality and the environment**
- **Have documented procedures where necessary**
- **EMS provides management structure for improving your biosolids program**

EMS WORKSHOP

Prior to starting with the Elements, an exercise was conducted on “Identifying challenges in developing and implementing a Biosolids EMS”. There are many pressures facing biosolids operations, such as reduced land application sites and poor public perception of biosolids. The ten groups were each given an EMS challenge, the task of developing goals and action plans as shown in Appendix D, Exercise 1 page 21. Selected evaluation responses were solicited.

NBP/EMS Elements 1-5, 10, 12, 13

Following is a listing of NBP expectations also referred to as Minimum Conformance Requirements (MCR) for Elements 1-5, 10, 12, 13.

Element 1: EMS Manual

NBP MCR:

- Manual needs to describe applicable policies, programs, plans, procedures and management practices in the EMS
- Manual needs to be approved by top management
- Manual must contain the policy and EMS procedures required by the EMS Elements
- Manual needs to contain a cross reference to public participation, communications, emergency preparedness and response programs and plans required by the EMS Elements
- Manual needs all applicable Critical Control Points

Element 2: EMS Policy

NBP MCR:

- Policy that commits the organization to the NBP Code of Good Practice
- Communicate the policy to employees, contractors, and all interested parties
- Incorporate the policy into the organization’s biosolids programs, procedures, and practices

Copies of policies from the following certified agencies were included in the manual:

Madison, Wisconsin
Albany, Oregon
King County, Washington
Orange County, California
Kent County, Delaware

Appendix D, Exercise 2 page 31, outlines the specifics of the exercise.

Element 3 and 10: Critical Control Points and Operational Controls

Critical Control Points (CCP) were identified as those locations, unit processes, events and activities throughout the biosolids value chain under the organization's direct control or influence that require effective policies, programs, procedures, practices, monitoring and measurements to assure the biosolids activities meet legal, quality and public acceptance requirements and do not have undesirable environmental impacts.

It was noted that identifying CCPs (and the related operational controls) along an organization's biosolids value chain is fundamental to effectively operating an EMS for Biosolids.

The NBP MCR will:

- Identify all CCPs that you need to manage to support the four NBP outcomes
- Identify environmental / quality impacts for each one
- Identify CCPs that are consistent with the NBP National Manual of Good Practice (Appendix F) – Please see Appendix E page 35 for Appendix F – *Critical Control Points throughout the Biosolids Value Chain*
- Demonstrate that you manage them effectively
- Monitor key parameters as needed at each CCP
- Develop and implement SOPs, work management practices, or other methods at all critical control points to effectively manage potential environmental impacts
- Incorporate all legal and other requirements in operational controls
- Consider applicable best management practices as defined in the *National Manual of Good Practice* and other authoritative sources
- Include preventative maintenance procedures and work management systems for maintaining equipment, instrumentation, vehicles, and other treatment technology and process control systems associated with biosolids management activities
- Require contractors to establish operational controls consistent with their biosolids management roles and responsibilities

Appendix D, Exercise 3 page 32 was designed so that each group could define CCPs, identify environmental impacts and develop operational controls of the CCPs. Also see Appendix E, page 35, for other CCP's examples.

Element 4: Legal and Other Requirements

The NBP MCR will:

- Establish a procedure for identifying and tracking legal (federal, state, and local) and other requirements applicable to the organization's biosolids management activities.
- Establish and maintain records of applicable legal and other requirements.
- Include a management process for incorporating changes and new requirements into the Elements of the EMS.

Element 5: Continual Improvement – Goals and Objectives

The training stressed that performance improvement goals and objectives link high-level principles to day-to-day processes and procedures.

The NBP MCR are:

- Goals and objectives that support improvement in the four NBP outcome areas
- Consider input received through public participation activities
- Use SMART criteria (Specific, Measurable, Achievable, Relevant and Time-bound)
- Establish action plan that spells out the details
- Communicate goals to employees, contractors, and make available to interested parties
- Measure progress – performance indicators
- Review and update

Please see Appendix D, Exercise 4 page 33.

Element 12 – Documentation/Document Control

Minimum Conformance Requirements:

- Establish and maintain documentation, documents and records for the Biosolids Management program including the 17 elements of its EMS.
- Establish and maintain document control procedures and practices to ensure that its Biosolids Management program documentation and documents are:
 - Available and easily located
 - Created following established document creation protocols
 - Kept up to date through periodic review and revision
 - Properly marked with version number, effective date and references to replaced or superseded versions
 - Approved by authorized personnel
- Establish and maintain records of biosolids management activities and ensure that they are:
 - Available and can be easily located
 - Retained for the specified period of time
- Establish documentation/document control and record requirements for biosolids management activities conducted by its contractors in Service Agreements, and incorporate these requirements into its EMS for biosolids.

Element 13 – Monitoring and Measurement

Minimum Conformance Requirements:

- Establish and maintain regular monitoring and measurement procedures and practices for all biosolids management activities to assure compliance with applicable legal and other requirements, measure biosolids program performance at critical control points and track progress toward achieving program goals and objectives.
- Record monitoring and measurement results and maintain records as established in the record keeping procedures under Element 12.
- Require contractors to establish and maintain regular monitoring and measurement procedures and practices for their assigned biosolids management activities, as defined in their service agreement.

The students were asked to choose two goals and complete the worksheet shown in Appendix D, Exercise 5 page 34.

SUMMARY AND RECOMMENDATIONS

Participants are invited to share their thoughts and comments both during and after the workshop. This feedback is part of the continual improvement process of presenting training courses. The instructional team makes every effort to incorporate suggestions in future training courses.

Input was received in an open forum after day one. These comments are shown in Appendix F, page 36. At the conclusion of the class, written evaluations were collected and summarized. (Appendix G, page 37)

As a result of review of the evaluations, having discussions with NBP personnel and the instructional team, the following recommendations are being made.

- Continue the meetings with technical assistants on both days. Also during these meetings with the technical assistants, have an activity for the contractors.
- Continue to have a Case Study Presentation.
- Regarding logistics, consider having a shorter lunch break.
- Review agenda and possibly modify times.

ASSIGNMENT

EMS workshop # 2 will be held in Murfreesboro, TN on July 10 and 11, 2007. The assignment sheet (Appendix H, page 45) is due at that time.

CERTIFICATES

UF/TREEO will award 1.4 CEU's to those that attend the entire 2 day workshop. A sample copy of the certificate is shown in Appendix I, page 46.

Appendix A: List of Attendees

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Name _____

Agency _____

Date _____

Appendix B: NBP EMS Assignment # 1

Instructions

At the Kick-off Meeting, each agency was asked to complete the following in preparation for their EMS Assessment and Implementation Visit and the upcoming Workshop #1. Please answer each item as specifically as you can. If you have any questions, please contact your Account Executive, Pete Machno (peterm7@prodigy.net), or Lori Stone (lori_stone@adelphia.net).

Assignment

EMS Status/Progress

1. When was your EMS Implementation Planning Visit? _____

2. What was the most helpful aspect of the Planning Visit to you and your team (please try to be specific)? _____

3. **What** and **when** is your next major milestone? _____

Biosolids Policy

4. Does your agency have a Biosolids Policy? _____

Biosolids Quality/Critical Control Points

5. What are the top 4 biosolids quality characteristics that you need to manage consistently in order to have a successful biosolids end-use/disposal program (e.g., minimal odors, pathogen reduction, percent solids concentration, etc.)?

6. Which processes/critical control points do you need to manage to ensure that you achieve these biosolids quality characteristics? _____

Relations with Interested Parties

7. From your list of Interested Parties, name 3 that are your top priority as you develop your biosolids EMS. _____

Workshop #1 Preparation

8. Before the workshop, please read the **17 EMS Elements** (NBP requirements). List 3 specific questions that you would like answered at Workshop #1.

Appendix C: Agenda

University of Florida National Biosolids Partnership EMS Workshop # 1 May 22-23, 2007 in Murfreesboro, Tennessee

Day 1 – Tuesday, May 22, 2007

8:30 – 9:00 am	Welcome & Introductions (William T. Engel, Jr. and Peter Machno)	
9:00 – 10:00 am	Workshop Agenda, Objectives and The EMS Development Process (William T. Engel, Jr.) -Where the agencies are at in the development process (technical assistance visit #1, elements drafting) -Overview and framework for EMS elements	Session 1
10:00 – 10:15 am	BREAK	
10:15 – 11:00 am	Element 1 EMS Manual (Doug Dean) -Minimum conformance requirements -Lessons learned and available resources	Session 2
11:00 – 12:00 pm	Element 2 Biosolids Management Policy (William T. Engel, Jr.) -Minimum conformance requirements -Commitment to the <i>Code of Good Practice</i> -Integrating and communicating your policy -Exercise: policy statements	Session 3
12:00 – 1:00 pm	LUNCH – Networking Opportunity	
1:00-2:15 pm	Element 3 Critical Control Points & Element 10 Operational Control of Critical Control Points (William T. Engel, Jr. and Doug Dean) -Minimum conformance requirements and definitions -Tips for addressing elements -Exercise: critical control points and operational control	Session 4
2:15 – 2:30 pm	BREAK	
2:30 – 3:30 pm	Meet with Technical Assistants (Peter Machno) -Review EMS implementation progress, challenges, small agency manual and production of Elements 1, 2, 3 and 10 and next steps	

1:45 – 2:30 pm	<p>Element 13 Monitoring and Measurement (Doug Dean)</p> <ul style="list-style-type: none"> -Minimum conformance requirements -Purpose and connection to other elements -Exercise: Monitoring and measurement 	Session 9
2:30 – 2:45 pm	BREAK	
2:45 – 3:30 pm	<p>Meet with Technical Assistants (Peter Machno)</p> <ul style="list-style-type: none"> -Review use of small agency manual and production of Elements 4, 5, 12 and 13 and next steps 	
3:30 – 3:45 pm	<p>What's Next (William T. Engel, Jr. and Peter Machno)</p> <ul style="list-style-type: none"> -Overview of workshop #2 -Handout of homework assignment #2 	
3:45 – 4:00 pm	<p>Feedback on Workshop #1 (Peter Machno)</p>	
4:00 pm	Wrap-up and Adjourn	

Appendix D: Exercises

**University of Florida
National Biosolids Partnership EMS Workshop # 1
May 22-23, 2007 in Murfreesboro, Tennessee**

- I Dealing with Challenges
- II EMS Policy
- III Critical Control Points and Operational Controls
- IV Goals & Objectives for Continual Improvement
- V Monitoring/Measurement Development

NBP EMS Workshop #1

Exercise 1: Dealing with Challenges

EXERCISE 1: DEALING WITH CHALLENGES - Group 1

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>After an initial EMS Awareness class, the Director of Public Works pulls you aside and asks questions about the public participation/communication elements of the EMS. The Director is of the opinion that “no news is good news”, that it’s best to lie low and not give out information. The ability to implement these elements is in doubt without the Director’s support.</p>		

EXERCISE 1. DEALING WITH CHALLENGES – Group 2

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>The Director of Public Works has been assigned the task of developing and signing the Policy. Everyone else is moving along on their tasks, but the Director seems to be putting his task off. His commitment to the EMS is suspect.</p>		

EXERCISE 1. DEALING WITH CHALLENGES – Group 3

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>The Director of Water/Wastewater in charge of budgets was initially in favor of the EMS effort, and even authorized sending three managers to a workshop. However, as details emerge on what the EMS requires, the Director begins to have serious concerns over the cost of developing and maintaining the EMS.</p>		

EXERCISE 1. DEALING WITH CHALLENGES – Group 4

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>As the EMS Coordinator you provide an initial “EMS Awareness” class to the participants. However, as you go around seeking support to build the EMS, it becomes obvious that less than 10% of the training was remembered, and folks don’t have a clue. How do you reinforce training in EMS benefits and concepts?</p>		

EXERCISE 1. DEALING WITH CHALLENGES – Group 5

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>Chief Operator who is set to retire in six months hears about the EMS and isn't very excited about it. You fear this attitude may spill over into rest of the workforce, and need to shore up the buy-in to the EMS.</p>		

EXERCISE 1. DEALING WITH CHALLENGES – Group 6

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>As the EMS Coordinator, you realize that there are unwritten SOPs that manage various elements of the biosolids value chain. The training for these has been through word of mouth. You will need operators' help in writing procedures, setting up training, and formalizing much of the process-yet, the operators are already stretched thin and hate to write SOPs.</p>		

EXERCISE 1. DEALING WITH CHALLENGES – Group 7

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>There have been efforts in the past to hold meetings to educate the public on biosolids, and nobody showed up. You question whether these efforts do any good, yet the EMS requires public outreach and you need to show progress in this area.</p>		

EXERCISE 1. DEALING WITH CHALLENGES – Group 8

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>The EMS requires that contractors be involved in the EMS. As you consider the contractors, you believe some might go along, but you expect resistance from others. But you need to involve all the contractors.</p>		

EXERCISE 1. DEALING WITH CHALLENGES – Group 9

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>The EMS public participation seems to be going well, but one stakeholder begins asking for information beyond reason. This person, who has a bad history with the utility, might be using the public outreach as a way to hassle the biosolids effort. You need to deal with this person in a way that doesn't reflect poorly on the public outreach efforts.</p>		

EXERCISE 1. DEALING WITH CHALLENGES – Group 10

<i>The Challenge</i>	Describe the Solution/Goal	Develop Step-Wise Action Plan for Goal
<p>As the EMS Coordinator, you hold a meeting and assign tasks to various personnel to build the EMS framework. As you monitor progress, you find that hardly anyone seems to be following through, citing competing responsibilities. You're starting to worry about your deadlines for getting the EMS together.</p>		

NBP EMS Workshop #1

Exercise 2: Policy

This exercise will be conducted at your round table. There are copies of the policies from several of the certified agencies. Each table has one of these policies.

1. Compare the NBP minimum conformance requirements of an EMS policy with the policy at your table.
2. Compare your plant's policy, if available to the NBP minimum conformance requirements of an EMS policy.
3. Appoint a spokesperson to report out to the class on one of the policies (i.e. does it meet the NBP minimum conformance requirements).

NBP EMS Workshop #1

Exercise 3: Critical Control Points and Operational Controls

Biosolids Value Chain	Critical Control Point	Operational Control	SOPs	Monitoring and Measurement	Potential Environmental Impacts
Solids Processing	Screening and grit removal	Operator screen maintenance	<i>SOP- Headworks</i>	Level sensor on screen system. Grit removal in lbs/day.	Controls plastics and other unwanted materials in biosolids

NBP EMS Workshop #1

Exercise 4: Goals & Objectives for Continual Improvement

The class is broken down into three groups. The instructor will use one of the four key outcomes as an example then each group is assigned one of the three remaining key outcomes.

- Regulatory compliance
- Quality management practices
- Improved relations with interested parties
- Environmental performance

The groups are to reach a consensus on a goal, objective and develop an action plan. The information should be listed below

OUTCOME:

GOAL:

OBJECTIVE:

ACTION PLAN:

NBP EMS Workshop #1

Exercise 5: Monitoring/Measurement Development

Assignment: Choose goals that address outcome areas. Discuss with group, fill out table. Document your assumptions. Be prepared to share results with full group. Develop action plans (on flip chart) to ensure data are collected to support proposed metrics.

Goal	Primary Audience	Primary purpose	Outcome areas				Source of data	Proposed measure	Is it SMART?
			A	B	C	D			
Reduce purchased energy use per M gallons treated by 10% from 2004 baseline by 2007.	Management, ratepayers, elected officials	Reduce costs, improve environmental performance, improve efficiency, support investment in premium efficiency motors when replacing equipment		x		x	Power bills, onsite meters	Purchased KWh per MM gallons treated per year	Yes

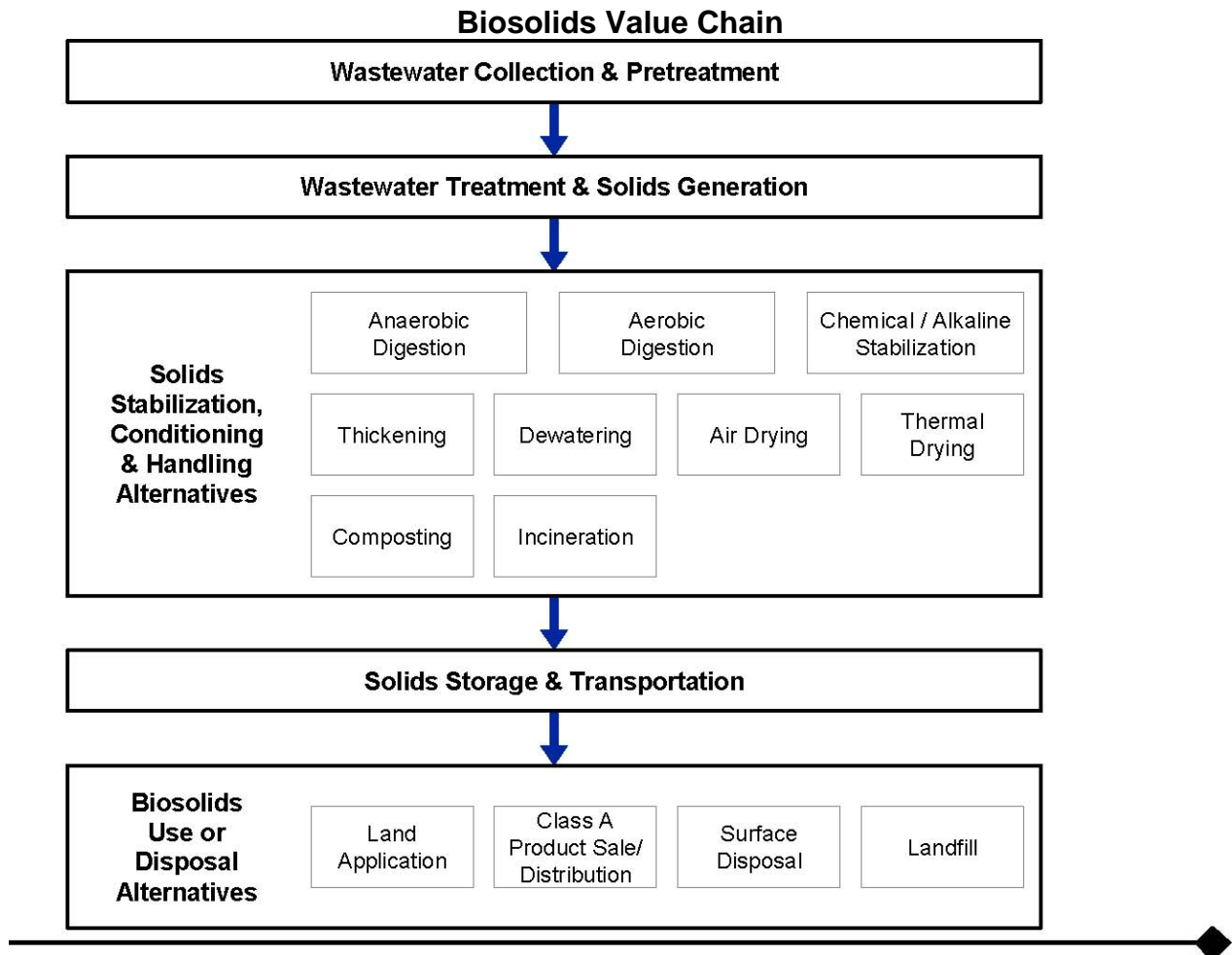
Outcome areas: A=Quality Management Practices, B= Relations with Interested Parties, C= Regulatory Compliance, D= Environmental Performance
 SMART = Specific, measurable, achievable, relevant and time-specific

Appendix E:

Appendix F – Critical Control Points throughout the Biosolids Value Chain

The purpose of this appendix is to clarify identification of critical control points throughout the biosolids value chain. Critical control points are locations, unit processes, events, and activities throughout the biosolids value chain, from pretreatment through final use or disposal of biosolids. Effective management of critical control points assures that biosolids management activities meet legal, quality, and public acceptance requirements and do not have undesirable environmental impacts. This effective management of critical control points is accomplished with operational controls. Each critical control point has one or more associated operational controls. Operational controls include standard operating procedures, work practices, process controls, and monitoring and other management methods such as ordinances, permits, periodic reports and inspections.

At each major step in the value chain (e.g., solids stabilization, conditioning and handling), wastewater treatment facilities have a variety of alternative processes to choose from. For example, solids stabilization methods might include aerobic digestion, anaerobic digestion, chemical stabilization, composting, thermal drying and/or air drying. In identifying critical control points, organizations participating in the NBP EMS Program must include all methods that apply to local operations. Some alternatives may not apply to some operations.



Organizations participating in the NBP EMS Program are required to identify critical control points that are consistent (e.g., similar in scope and scale) to those in the *National Manual of Good Practice*. The table below can help organizations confirm that their critical control points meet NBP requirements. For example, if an organization were to identify “Wastewater Treatment” as a critical control point, this would be too broad in scale and scope to allow for effective mapping and management of environmental impacts and operational controls. Wastewater Treatment refers to an entire link in the biosolids value chain or a broad category of critical control points. To be consistent with NBP expectations, an organization would need to dig deeper within Wastewater Treatment to identify specific locations or activities – such as anaerobic digestion, air drying systems, or solids dewatering.

The NBP encourages organizations to go even one level deeper when identifying critical control points, as indicated in the table below. For example, under anaerobic digestion, organizations could identify digester temperature and detention time as critical control points needing effective management to assure that biosolids activities meet legal, quality, and public acceptance requirements and do not have undesirable environmental impacts.

As discussed, earlier, the guidance contained in this manual is not intended to be interpreted as requirements that third party auditors will use. Auditors should ask if the manual was consulted during the identification of critical control points and operational controls. However, auditors should recognize that each facility and biosolids management program is unique. Consequently operating procedures will be unique as will the selection of critical control points and operational controls. Auditors should recognize and allow for the possibility that a critical control point for one organization may be listed as an operational control (or monitoring/measurement) by another organization.

Biosolids Value Chain		Examples of Critical Control Points
Wastewater Collection and Pretreatment		Industrial – Significant Industrial User discharges
		Commercial user discharges
Wastewater Treatment and Solids Generation		Solids screening / grit collection
		Scum blanket
		Primary treatment
		Secondary treatment
Solids Stabilization, Conditioning, and Handling		Anaerobic digestion -Temperature -Digester mixing -Detention time -“End product” meets regulatory requirements -Any regulatory/permit requirements that identify specific locations/activities that need to be managed
		Aerobic digestion -Temperature -Digester mixing -Aeration requirements -“End product” meets regulatory requirements -Any regulatory/permit requirements that identify specific locations/activities that need to be managed
		Chemical stabilization – Class B product -Quality of add mix of chemicals / lime -Mixture consistency -Mixture pH and temperature -Mixture detention time -Any regulatory/permit requirements that identify specific locations/activities that need to be managed
		Chemical stabilization – Class A product -Quality of add mix of chemicals / lime -Mixture consistency -Mixture pH and temperature -Mixture detention time -“End product” meets regulatory requirements -Location of facility – air emissions management -Any regulatory/permit requirements that identify specific locations/activities that need to be managed
		Composting -Quality of add mix of bulking agent -Mixture consistency -Mixture temperature -Mixture turning -Mixture detention time -“End product” meets regulatory requirements -Any regulatory/permit requirements that identify specific locations/activities that need to be managed

Biosolids Value Chain	Examples of Critical Control Points
Solids Stabilization, Conditioning and Handling (continued)	Air drying system -Location of facility -Mixture turning -Mixture temperature - Mixture detention time -“End product” meets regulatory requirements -Any regulatory/permit requirements that identify specific locations/activities that need to be managed
	Thermal drying systems -Location of facility – air emission management - Temperature -Detention time -Stack emissions -“End product” meets regulatory requirements -Storage bin / silo -Any regulatory/permit requirements that identify specific locations/activities that need to be managed
	Bioenergy / Incineration -Thickening -Dewatering -Scum conditioning - Thickened solids holding tank -Burn zone -Scrubber -Stack emissions -Any regulatory/permit requirements that identify specific locations/activities that need to be managed
	Dewatering -Location of facility -“End product” meets specifications / percent solids
	Thickening -Location of facility -“End product” meets specifications / percent solids
Solids Storage and Transportation	Solids storage -Site location -Distance to neighbors -Road access -Set back from surface water -Depth to groundwater -Any regulatory/ permit requirements that identify specific locations/activities that need to be managed
	Solids transportation -Truck (e.g., maintenance, appearance) - Truck cover - Transportation route -Truck cleaning facilities -Any regulatory/permit requirements that identify specific locations/activities that need to be managed

Biosolids Value Chain	Examples of Critical Control Points
Biosolids End Use or Disposal	<p>Land application -Application site location -Location of off loading from trucks - Interim storage/staging area -Perimeter of biosolids application site-setback distances from surface water/neighbors/wells -Depth to groundwater - Agronomic rate -Truck cleaning on site -Any regulatory/permit requirements that identify specific locations/activities that need to be managed</p>
	<p>Class A/EQ product sale and distribution -Product and packaging specifications -Product application rates -Product transportation -Any regulatory/permit requirements that identify specific locations/activities that need to be managed</p>
	<p>Landfill -Landfill -Any regulatory/permit requirements that identify specific locations/activities that need to be managed</p>
	<p>Surface disposal -Site location -Perimeter of application site – setback from surface water/neighbors/wells -Depth to groundwater -Truck cleaning site - Access road -Any regulatory/permit requirements that identify specific locations/activities that need to be managed</p>

Appendix F: Day One Ending Comments

**University of Florida
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- Message: K-I-S-S
- Good network Opportunities
- Breakouts a plus
- Some slides hard to read
- Benefit from examples
- Relate to others concerns
- Learned that EMS applies to large-small operations
- Perhaps send questionnaires early to cut intro session down in time
- Good resource references on line
- Plan to work w/private Companies
- Lost some momentum during lunch
- Workshop timing good
- Policy exercise-use small agencies

Appendix G: Evaluations

University of Florida
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PROGRAM	<u>Poor</u>				<u>Excellent</u>
	1	2	3	4	5
Course content met expectations					4.04
Level of content was appropriate					4.08
Course was relevant to job needs					4.32
Time allocated for coverage of topics					3.83
Effectiveness of audio visuals					4.00
Usefulness of course materials/handouts					4.32
Accomplishment of learning objectives					4.20
PRESENTATIONS					
Interesting					4.04
Responses to questions					4.54
Emphasis on important topics					4.32
Clarity of presentation					4.20
Enthusiasm and energy					4.16
Knowledge of the subject					4.56
Group discussions					4.40
Breakout Session					4.16
OVERALL RATING OF COURSE					
Course					4.13
Instructor(s)					4.44
Organization of program					4.40
Facility used/meeting room					4.32
Break functions/lunch functions					4.36
Hotel accommodations					4.33

WRITTEN COMMENTS

1. General Comments

- A. This has been most helpful to continue focus in on the “nuts and bolts” of the process.
- B. Too much time wasted on breaks & lunch (hold people to no more than 10 minute breaks and 30 minutes is plenty of time when lunch is provided).
- C. The meeting room seemed too warm at times perhaps related to the open doors.
- D. Very good
- E. Very well organized and presented.
- F. Doug Dean was excellent speaker- very clear and focused talks. Jerry Stewart’s presentation was key-must always have the person who has walked the talk.
- G. It would be valuable to have internet access, especially for speakers so they can go to examples etc. on line.-also agencies: tech assistants can email things to each other on the spot. More important – it could be very good to be able to “create” examples by inputting directly on the computer & projecting – or at least use the white board.
- H. More available power outlets at the center would be helpful (I’ll bring an extension cord in July) room was hot.
- I. Informative
- J. Great course/group sessions/breakout session big help. Getting to hear how others are dealing with program is a great help in the overall understanding of the program.
- K. Good examples, good practice exercises.
- L. Sessions were good. Instructors were effective and knowledgeable.
- M. Working lunch or at least shorten to ½ hour to keep momentum. Please provide small agency manual examples for exercises. May need to add a 5th EMS out zone: pg 1-8 “continual improvement” Suggestions biosolids value chain, instead of “cradle to grave”, may want to use “cradle to cradle” (reuse); WIFI access would be very helpful to participants; add more hands-on brainstorming, it seemed to work really well!
- N. Good format – very informative- useful information to mapping plan for EMS and NBP program.
- O. Worry a little that July meeting is a little too quick.
- P. I thought the workshop was well organized and very helpful. Instructors were knowledgeable. Facility was adequate but it might be nice to have outlets for computers or even wireless connections-please provide water throughout the day.
- Q. Very helpful. Will help speed up our process of getting certified.
- R. Maybe due to subject area, but course seemed to move slowly.
- S. Planning & presentation were great; food was great; would have appreciated less time on group exercises, (i.e. grouped folks in larger groups to minimize time spent)
- T. Need more time to work with agency. Many of the slides were repetitive. Breaks too long and too often.

2. Describe the most valuable portion of the course.

- A. Break out exercises
- B. Sharing of personal experiences; Organizational skill development.
- C. The group practical exercises; the case study presented by Mr. Stewart.

- D. Emphasis on “it doesn’t have to be done, just show how you’re going to get there; openly addressed and worked out issues, questions and concerns.
- E. Interaction with participants, discussion on common issues, different perspectives represented, i.e. utility, account exec, auditor.
- F. Interaction with other participants-how they “handled” certain situations. (opportunities)
- G. Simplified what at first glance seems to be an ephemeral and thankless process.
- H. #1-Excellent-Discussion of challenges and how to overcome them; #2-Hands-on exercises working on particular elements-e.g. writing our the CCP’s table; #3-clear review of conformance requirements for each element.
- I. Access to experts to answer specific questions on developing an EMS. Also enjoy the group discussions.
- J. Networking with other agencies & tech assistants, case study!! Really funny and good insight work directly with tech assistant.
- K. Minimum conformance standards were the most helpful at highlighting the tasks that are priority. They could have been a little more developed and organized. Also the exercises.
- L. Group discussions and examples.
- M. Group sessions, breakout groups, actual program/agency case study.
- N. Time to work with technical assistants, answer question sessions.
- O. Listening to others and learning from experience. Having an auditor in the class gave a different perspective.
- P. Exercise in dealing with challenges; hearing experience/challenges of others; case study; writing/sharing goals & objectives – INCREDIBLY VALUABLE! a small “ah ha” moment.
- Q. Content of information; guidelines and reference to templates for EMS; sharing of information by attendees.
- R. Networking –working with others that are working on same programs.
- S. Minimum conformance requirements – very helpful; exercises involving review of approved elements so we could see how others approached them; networking.
- T. The manual with all of the examples and procedures.
- U. Open discussion within elements framework.
- V. Time to work with agency – need more of it. I thought this was going to be a key focus but it was more of an after thought.

3. Describe the least valuable portion of the course.

- A. General discussion of the process vs. very specific work on the actual elements.
- B. Account exec. Meetings-didn’t apply to private companies/preparers.
- C. One participant that continuously interjected a comment.
- D. Some of the account executives try to promote themselves by interjecting at every statement. This kills the forward momentum of the class and puts strains to include all the material.
- E. First 1-1/2 hours the first day- repetitive. Breaks are too long and too many. Could have more times allotted for technical advisors to work with agencies, instead of breaks. Day could be longer too- I felt there was not used as effectively as possible-want to make sure

that people coming from a distance find it worth their time. Might consider tightening up the timing of the second day, because many New Englanders found the last flight out is 5:30pm-so ending by 3pm would be useful-having to stay over another night adds expense + time- 3N.E. companies are already paying their own way.

- F. Re-hash of some/similar points throughout the course.
- G. Early on 1st day-slow & redundant. Intros were great though-good to really learn who's involved. Include small agency manual templates in training material for reference and use. End day 2 earlier, so people can get to the airport (45 minutes away). Better to start earlier -8am-we're all used to the hours. And/or extend day 1 by a half hour. Establish means of sharing examples of development among agencies (such as G&O, CCP's-OC's-MM) Good examples given in breakouts-want to capture!
- H. Introduction to the program/somewhat repetitive from kick off, 1st planning visit, and early presentation on NBP's EMS program but it was short.
- I. Slow go in the morning on Tuesday.
- J. Better time management of breaks.
- K. Started to get a little confusing as the 2nd afternoon sped up to keep time constraints.
- L. Maybe a couple of 30-minute breakaways with peer agencies to discuss progress in NBP program would be helpful.
- M. Need to tailor the time w/ account execs, so there is something for private companies-someone like an instructor to work on manual.
- N. Exercise: internal challenges to EMS.
- O. Workshop moves too slowly! I appreciate the need for introductions and logistics, but when the 1st hour and a half is spent doing that, I don't think you are being considerate of everyone's time. Everyone has made comments about how difficult it is to find time to do this program. These workshops would be much more valuable and appreciated if they were a one-day, very efficient workshop not a half day social event.



Appendix H: NBP EMS Workshop #1 Homework Assignment # 2

Instructions

At the last workshop, each participant was asked to complete the following in preparation for the upcoming Workshop #2. Please answer each item as specifically as you can. If you have any questions, please contact your Account Executive, Pete Machno (peterm7@prodigy.net), or Lori Stone (lori_stone@adelphia.net).

Assignment

EMS Status/Progress

1. Which elements have you completed so far? _____
2. What seems to be your most difficult challenge to EMS development progress?

3. **When** was the last time you worked/interacted with your Account Executive? Was it helpful? Do you have any recommendations for improvement?

4. **When** is your projected date for EMS completion? Once you complete your draft manual, your Account Executive will schedule your EMS Status Review, after which you can begin your operational phase. _____

Biosolids Quality/Critical Control Points

5. Have you had any difficulties with producing consistent quality biosolids, and managing your process/critical control points? If yes, please explain.

Relations with Interested Parties

6. **Who** is your state regulator responsible for your biosolids management operations? **When** was the last time you spoke with him/her? _____

7. Before the workshop, please read about Elements 6-9 and 11 in the **NBP EMS Guidance Manual**. List 3 specific questions that you would like answered at Workshop #2.

Appendix I: Certificate

**University of Florida
National Biosolids Partnership EMS Workshop # 1
May 22-23, 2007 in Murfreesboro, Tennessee**

TREEO CENTER

Center for Training, Research and Education for Environmental Occupations

«**STUDENT**»

Attended

NBP EMS Workshop #1

May 22-23, 2007

and is awarded this

Certificate of Attendance

Date issued:
CEU's :

05/23/2007
1.4



William T. Engel, Jr., Ph.D.
Director