National Biosolids Partnership

Biosolids EMS Verification Audit Report

City of Raleigh Public Utilities Department
Neuse River Wastewater Treatment Plant
Raleigh, North Carolina

Report Date: December 19, 2006

Audit Conducted By

KEMA-Registered Quality, Inc., Chalfont PA
Auditors: Mr. Jon Shaver, Biosolids EMS Lead Auditor
Mr. Michael Wardell, Biosolids Auditor

Audit Dates

Documentation Review – September 20, 2006
Onsite phase 1 – October 17 to 19, 2006
Onsite phase 2 – November 27 to 30, 2006
Corrective Action Audit – December 17, 2006

Review and Approval

Report Prepared By: Jon Shaver, Biosolids EMS Lead Auditor
Peer Review By: Dale Scherger, Biosolids Auditor
Final Approval By: Pierre Salle, President – KEMA-Registered Quality, Inc.

Table of Contents

1. SUMMARY 3
   A. Audit Scope and Methodology 3
   B. Summary of Audit Findings 3
   C. Verification Statement 4
   D. Requests / Agreements 4
   E. Appeals Process Information 4

2. AUDIT DETAILS 6
   A. Local Agency Details 6
   B. Audit Phases and Timing 6
   C. Audit Team 6
   D. Reference Materials 7
   E. Definitions of Terms 7

3. SUMMARY OF AUDIT RESULTS 8
   A. EMS Outcomes 8
   B. Audit Results by EMS Element 9
   C. Transaction Tests 10
   D. Corrective Action Audit 11
   E. Opportunities 11

4. DETAILED AUDIT RESULTS & FINDINGS 13
   Audit - EMS Documentation 13
   Audit - Biosolids Policy 13
   Audit - Biosolids Production (including Maintenance) 13
   Audit - Biosolids Use & Disposition 15
   Audit - Communication 16
   Audit – Competency, Awareness & Training 16
   Audit – Compliance (with Legal & Other Requirements) 17
   Audit - Corrective and Preventive Action 17
   Audit - Critical Control Points 18
   Audit - Document Control & Recordkeeping 18
   Audit - Emergency Preparedness 18
   Audit - Goals and Objectives for Improvement 19
   Audit - Internal Audits 20
   Audit - Management Involvement and Review 20
   Audit - Planning & Public Participation 21
   Audit - Roles & Responsibilities 21

APPENDICES 22
   a) List of Interview Participants 22
   b) List of Documents Reviewed (by EMS Element) 23
   c) Desk Audit Findings (by EMS Element) 26

1. SUMMARY

KEMA-Registered Quality Inc. (KEMA) conducted an independent Verification Audit of the Biosolids Environmental Management System (EMS) being used by City of Raleigh Public Utilities Department (CORPUD) in managing their biosolids activities. The purpose of the audit was to verify that the EMS being used by CORPUD conforms to expectations and requirements of the National Biosolids Partnership (NBP) *Environmental Management System for Biosolids* standard, comprised of 17 EMS Elements. The audit was also intended to verify that the EMS is functioning as intended, practices and procedures are being performed as documented and that the EMS is producing desired outcomes.

A. Audit Scope and Methodology

This Verification Audit covered the entire biosolids value chain (pretreatment, collection and treatment, stabilization, storage and transportation and end use / disposition, or equivalent) as applied to CORPUD's biosolids program, with special attention to practices and management activities that directly support biosolids-related operations, processes and activities.

The scope of this audit included:

- Review of CORPUD Biosolids EMS Documentation (EMS Manual).
- Audit of EMS processes used by CORPUD in managing their biosolids activities, covering all requirements of the 17 EMS Elements.
- Audit of CORPUD contractor control practices, including interviews with contractors being used.
- Interviews with interested parties, including regulators, neighbors and environmental advocates.
- Testing of pertinent transactions to assess EMS functionality.
- Examination of outcomes being achieved by CORPUD through the use of their EMS.

The audits were performed by assessing key processes within the CORPUD biosolids program for conformance with requirements of applicable EMS Elements. Using sampling techniques, the auditors interviewed key persons, observed practices in place and reviewed pertinent documents and records for each process. Representative interested parties, including regulators, were interviewed to obtain stakeholder perspectives on the biosolids program.

B. Summary of Audit Findings

<u>EMS Strengths</u>

During this audit, the auditors observed the following strengths in CORPUD's biosolids program:

- The benefits of using a management system for the biosolids program are well understood and accepted.
- An effective teamwork approach is in place for continuing to improve the biosolids program.

- Improvements in biosolids quality and communications in the past 2 – 3 years have been recognized by interested parties and employees, resulting in positive media attention and increased public confidence.
- Overall plant housekeeping is well controlled, especially considering the level of construction activity taking place.

EMS Outcomes

CORPUD has achieved several significant outcomes through the use of an environmental management system in managing their biosolids program, including cost saving initiatives and improved public perception. Details are described in Section 3 of this report.

Nonconformances

During this audit, KEMA found 7 minor nonconformances with respect to the audit criteria, as described in the "Detailed Audit Results" section of this report. An additional nonconformance found during the audit was corrected and closed prior to completing the audit. CORPUD has prepared a Corrective Action Plan for each open nonconformance and KEMA's Lead Auditor has reviewed those plans and found them to be acceptable.

Opportunities for Improvement

During the audit, KEMA noted opportunities for improvement in the CORPUD biosolids EMS. These opportunities are described in the detailed audit reports.

C. Verification Statement

Based on the results of our audit, KEMA issues the following verification statement for the EMS being used by the City of Raleigh Public Utilities Department in managing its biosolids activities:

> *"The City of Raleigh Public Utilities Department has been independently verified by KEMA-Registered Quality Inc. as having an effective biosolids environmental management system that supports continually improving environmental performance, meeting regulatory compliance obligations, utilizing good management practices and creating meaningful opportunities for public participation and is in conformance with the requirements of the National Biosolids Partnership."*

D. Requests / Agreements

KEMA and CORPUD have agreed upon an overall plan for conducting interim audits of the CORPUD Biosolids EMS. Interim Audit #1 will be performed as an independent third party audit in November / December 2007. CORPUD will arrange for that audit through the National Biosolids Partnership.

E. Appeals Process Information

The NBP provides an appeals process for biosolids organizations and interested parties that disagree with the findings of a third party EMS audit. The verification appeals process involves an Appeals Board; representing a balance of biosolids management interested parties, including an environmental advocacy group, and wastewater industry professionals. An appeal must be submitted within 30 days of the official verification decision or interim audit decision by the Audit

Company. Anyone who may need help in understanding the appeals process should contact the National Biosolids Partnership staff, Mr. Eugene DeMichele at 703-684-2438, or send an e-mail to: edemichele@wef.org.

In addition, CORPUD may, if it chooses, appeal the manner in which this audit was conducted and/or any findings directly to KEMA by contacting KEMA's headquarters at 4377 County Line Road, Chalfont PA. KEMA will review any such appeal to verify that the audit and/or any findings are consistent with acceptable management system auditing practices.

2. AUDIT DETAILS

A. Local Agency Details

Agency Name: City of Raleigh Public Utilities Department (referred to as CORPUD in this report)

Facility: Neuse River Wastewater Treatment Plant, Raleigh, North Carolina

Volume of Wastewater Treated = 60 MGPD (capacity)

Biosolids Produced = 35 – 40 dry tons per day (Class A; resuming Class B in February, 2007

Number of Employees = 82

Biosolids Production Sites Audited

Neuse River Wastewater Treatment Plant, Raleigh, North Carolina

Biosolids Use / Disposition Sites Audited

Randy Edwards farm (land application)
Ray Weaver farm (land application)
McGill Environmental Services composting plant, New Hill NC

Contractors Interviewed

McGill Environmental Services

B. Audit Phases and Timing

The audit was performed in three phases. Phase 1 included a review of EMS Documentation and results were reported to CORPUD on September 30, 2006. Phase 2 was conducted onsite October 17 - 19, 2006 and included audits of fundamental EMS processes. Phase 3 was conducted onsite November 27 - 30, 2006 and included audits of remaining processes and EMS Elements, transaction tests, interviews with interested parties and examination of EMS outcomes.

A corrective action audit for a major nonconformance found during the onsite audit was performed on December 17, 2006 and verified effective correction of that nonconformance.

C. Audit Team

The National Biosolids Partnership assigned KEMA-Registered Quality Inc. to perform this audit on their behalf. KEMA's Audit Team consisted of:

Jon Shaver – Biosolids EMS Lead Auditor
Michael Wardell – Biosolids Auditor

These auditors are qualified for their roles through certification by the National Biosolids Partnership. KEMA asserts that the relationship that our firm and auditors have with the City of Raleigh Public Utilities Department is independent and meets criteria for Third Party Audit Companies and Third Party Auditors established by the National Biosolids Partnership.

D. Reference Materials

The following documents were used as references during this audit:

CORPUD EMS Manual (August 2006, revised 11/16/06)
National Biosolids Partnership "EMS for Biosolids" standard (May 2002)
National Biosolids Partnership Biosolids EMS Auditor Guidance (November 2004)
National Biosolids Partnership Code of Good Practice
National Biosolids Partnership Manual of Good Practice

E. Definitions of Terms

Major Nonconformance – an omission from requirements and/or other departure that represents, or could cause, a systemic failure and/or a departure from the Biosolids Policy.

Minor Nonconformance – an isolated departure from requirements that does not represent a systemic failure.

Opportunities (for Improvement) – suggested improvement(s) in the EMS based on auditor observations. There is no obligation for action in response to these observations.

Corrective Action Plan – a plan developed by the agency being audited to correct a nonconformance and/or prevent that nonconformance from re-occurring.

3. SUMMARY OF AUDIT RESULTS

A. EMS Outcomes

CORPUD reported the following outcomes from the use of an environmental management system approach to managing their biosolids program in the past 3 years: KEMA examined these outcomes and agree that they represent gains achieved by the use of the CORPUD biosolids EMS.

Regulatory Compliance

- No regulatory noncompliances have occurred in the past 3 years, leading to variance support from NCDWQ, approval for Class B production and associated crop revenue (approx $100K/yr).

Environmental Performance

- Content of metals in biosolids being produced at NRWWTP has reduced from approximately 75% of ceiling values to below 10% of ceiling values over the past 3 years, resulting in more acceptable product, longer field life and less controversy.

Biosolids Quality

- Improvements in biosolids admixtures have resulted in increased solids and reduced color in Class A biosolids, leading to more acceptable product and increased revenue (+$3 / ton = $130K / year).

Interested Party Relations

- Extensive feedback from employees and interested parties, including neighbors and regulators, indicates communication from NRWWTP has improved significantly in the past 2 – 3 years. This has led to more positive media attention, better relations with regulators and neighbors, improved staff morale and more informed decisions.
- Recognition by bond houses for NRWWTP environmental performance has enabled CORPUD to maintain a AAA bond rating. The financial benefit of this (compared to AA rating) is approximately $2 million / year for the current capital budget.
- Improvement in public confidence in NRWWTP competency enabled a $200M capital budget to be approved that will result in increased plant capacity, greater flexibility in operations and acceptable plans for merging suburban systems (as regional system).

B. Audit Results by EMS Element

The following nonconformances were identified and remain open as of the date of this report.

EMS Element	EMS Status (@ 12/18/06)	Open Nonconformances (corrective action plan approved for each nonconformance)
1. Documentation of EMS for Biosolids	Conforms	None
2. Biosolids Management Policy	Conforms	None
3. Identification of Critical Control Points	Conforms	None
4. Legal and Other Requirements	Conforms	None
5. Goals and Objectives for Continual Improvement	Minor Nonconformance	Minor Nonconformance JS&MW /06-01 Progress in completing action plans for achieving objectives / targets is being tracked during management reviews, however no records exist.
6. Public Participation in Planning	Conforms	None
7. Roles and Responsibilities	Conforms	None
8. Training	Conforms	None
9. Communication	Conforms	None
10. Operational Control of Critical Control Points	Conforms	None
11. Emergency Preparedness and Response	Minor Nonconformance	Minor Nonconformance JS&MW /06-02 There are several emergency plans in place for various events, but EMS Documentation does not reference all plans, making it unclear how the various emergency plans are used and relate to each other. Minor Nonconformance JS&MW /06-03 Requirements for McGill Environmental Services state that the Emergency Operation Plan needs to be implemented, however that plan addresses only transportation situations, indicating that contractor requirements for developing emergency plans have not been fully implemented.

EMS Element	EMS Status (@ 12/18/06)	Open Nonconformances (corrective action plan approved for each nonconformance)
12. EMS Documentation, Document Control and Recordkeeping	Minor Nonconformance	Minor Nonconformance JS&MW /06-04 Some key documents (e.g. emergency plans, some SOPs) are not being fully controlled (dated, approved, reviewed).
13. Monitoring and Measurement	Conforms	None
14. Nonconformances: Preventive and Corrective Action	Minor Nonconformance	Minor Nonconformance JS&MW /06-05 Relatively few formal Corrective Actions have been reported and those in place are recent and limited in scope, indicating that the Corrective and Preventive Action process is not being fully used.
15. Biosolids Program Periodic Performance Report	Not Applicable	This element was not audited, as instructed by NBP
16. Internal EMS Audits	Minor Nonconformance	Minor Nonconformance JS&MW /06-08 Internal audits to date have not provided conclusions about the effectiveness in meeting policy requirements or the performance of the goals and objectives process and have not audited documentation as stipulated by the CORPUD EMS requirements.
17. Periodic Management Review of Performance	Minor Nonconformance	Minor Nonconformance JS&MW /06-07 Management reviews have not fully assessed the performance of management system processes.

The auditors determined that the existence of multiple nonconformances does not represent a systemic problem.

Note – Nonconformance 06-06 was corrected and verified following this audit but before issuing this final report.

C. Transaction Tests

The following transactions were tested to confirm that the EMS responded effectively to them.

- Biosolids EMS requirements are being extended to modified facilities for Class B production, including critical control points and operational controls.

- EMS principles were used to investigate and correct a land application noncompliance in 2002, including investigation, corrective action planning and verification and updating procedures and responsibilities and training and implementation of improvement program
- Requests from local farmers (interested parties) to increase solids and minimize product color have been addressed, including operational controls and monitoring.

In each of the above situations, the CORPUD biosolids program was found to have satisfactorily adapted changes in operational controls and responsibilities

D. Corrective Action Audit

During the onsite audit, KEMA found the following Major Nonconformance:

> Major Nonconformance JS&MW /06-06/ El16 The only internal audit to date did not evaluate effectiveness of the biosolids program relative to goals, objectives and other performance measures or whether policy commitments are being met and results of that audit were not presented in a way that would enable management to make biosolids program performance improvements.

CORPUD took corrective action in response to this nonconformance, including performing an internal audit of part of their EMS. KEMA reviewed the results of that corrective action and verified that the nonconformance has been effectively corrected and closed. This led to a minor nonconformance finding referred to as Minor Nonconformance 06-08 (see audit: internal audits in Section 4 of this report).

E. Opportunities

<u>EMS Documentation</u>

1. Using flowcharts could be helpful in demonstrating system process interactions.

<u>Operations</u>

2. A site plan for biosolids land application could be useful in organizing and recording land application activities and controlled records could be useful in identifying trends and historical information.
3. Operators and Maintenance personnel are well aware of those points in the biosolids value chain that affect operating criteria (such as quality) and using this expertise could help in developing meaningful critical control points.
4. Consider rewriting the “Special Conditions for Contractors” document to include the Biosolids Policy and identify specific EMS requirements expected of contractors.
5. It is probably not useful to have the full EMS Manual in trucks carrying biosolids. Drivers need to be able to quickly access emergency information.
6. Consider how biosolids product odor and color could be measured, even if qualitative, to enable tracking.

Goals & Objectives

7. "Objectives" and "targets", currently listed separately, could be combined to have a combined list of objectives and measurable targets.
8. Establishing short and long term performance measures for key system processes, such as Communications, Corrective Action, Training, Maintenance could help in evaluating the effectiveness of those processes.

Competency & Training

9. A "competency checklist" could be helpful in verifying continuing competency for key operating and maintenance personnel.
10. The link between individual performance goals and strategic goals / objectives / targets should be formalized.

Management Involvement

11. A "management of change" plan for moving to Class B biosolids could be helpful in identifying and offsetting potential problems.

Communications

12. An interested party considers wastewater treatment issues (e.g. nitrogen reduction) to be related to overall plant performance. This can affect perceptions about biosolids program performance. Communication and education with this advocate about biosolids improvements could help in supporting and working with issues.
13. It could be helpful to understand why minimal feedback is being received from the Biosolids Newsletter.

4. DETAILED AUDIT RESULTS & FINDINGS

KEMA auditors made the following observations and findings during this audit. Process descriptions are summaries only.

Audit - EMS Documentation

Process Description

EMS procedures and practices are described in CORPUD EMS Manual, which is organized to correspond approximately to the EMS Elements. The manual is available on CORPUD website.

KEMA audited the CORPUD EMS Manual dated August 2006 as part of the scope of this Verification Audit. Details of that EMS Documentation Review are described in the appendices of this report. CORPUD addressed all of the "observations" noted in the Documentation Review and updated their EMS Manual prior to completion of this audit (revised manual dated 11/06). The revised manual was not fully reviewed (beyond agreed audit scope) except to verify that "observations" from the September Documentation Review had been corrected.

Audit Results

The EMS Documentation was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations.

Opportunities

- Using flowcharts could be helpful in demonstrating system process interactions.

Audit - Biosolids Policy

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Element 2.

Process Description

CORPUD's Biosolids EMS Policy Statement summarizes a full Biosolids Policy adopted by City of Raleigh Resolution 2005-404, approved 2/15/05. That Statement and the corresponding Resolution are available on the City of Raleigh website (www.raleighnc.gov) and include commitments to the NBP Code of Good Practice and specific biosolids management practices that are consistent with that Code.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations.

Audit - Biosolids Production (including Maintenance)

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 3, 10 & 13.

Process Description - General

Operational control(s) for each critical control point are identified in the CORPUD EMS Manual (Section 3 & 10). These operational controls, along with training and awareness, monitoring and measurement and legal requirements were reviewed during each process audit. Transaction tests for regulatory requirements and implementation of new / revised operational controls were performed during each process audit to verify that CORPUD is effectively using a systematic approach to plan, implement and check these controls. Identified critical control points and operational controls are consistent in scope with the National Manual of Good Practice.

Pretreatment & Collection

There is an active industrial pretreatment program that permits and monitors significant industrial users. Influent pH is monitored continuously as a guard against unexpected industrial discharges. There are currently 21 SIU's and 17 ID's that are regularly monitored and inspected. New potential permittees are determined through review of building/water connection permits, industrial directories and site inspections. Results of monitoring are reviewed regularly and current biosolids quality is reflective of the protections afforded by the pretreatment program.

Wastewater Treatment & Solids Stabilization

Solids are removed from the primary clarifiers and sent to the belt filter press for dewatering. Sludge from the secondary clarifiers is returned to the primary clarifiers and wasted along with the primary sludge. Influent is subject to screening and grit removal, with these materials being hauled to landfill. Changes to the facility are currently underway which will allow for the stabilization (aerobic digestion) of secondary sludges, which will allow land application of liquid Class B biosolids in the near future.

Solids Handling, Conditioning, Storage and Transportation

Dewatered biosolids from filter presses are transported (as dewatered sludge) to compost sites and to lime mixing for Class A production. The plant is capable of producing Class B from 4 digesters that are currently being used for storage only. Class A material is stored on a protected pad awaiting lab approval for shipment. Material is transported to compost sites by McGill Environmental and to Class A use sites by contracted trucking firms.

Operators understand product quality requirements (regulatory, solids content, aesthetics, odor) and follow written operating procedures. Operators are qualified through on the job performance assessment. Contractor drivers understand transportation requirements, including equipment condition and route assignments.

Maintenance

The plant Maintenance Department includes mechanics and I&E technicians who are qualified based on skills and on the job assessments. Weekly meetings are held to communicate ongoing matters. O&M Manuals are used to control maintenance activities for each piece of equipment. An electronic system (Mainstar) is used to generate PM and other work orders and store maintenance records. Some predictive maintenance is done using nondestructive testing and analysis of maintenance data. Critical equipment (identified) is inspected regularly.

Audit Results

The processes described above were found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations.

Opportunities

- Operators and Maintenance personnel are well aware of those points in the biosolids value chain that affect operating criteria (such as quality) and using this expertise could help in developing meaningful critical control points.
- It is probably not useful to have the full EMS Manual in trucks carrying biosolids. Drivers need to be able to quickly access emergency information.

Audit - Biosolids Use & Disposition

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 3, 7, 9, 10 & 13.

Biosolids Land Application

NRWWTP currently produces and markets a Class A biosolids product, used by participating farmers as a substitute for agricultural (dolomitic) lime in raising soil pH. Material is hauled to farm sites by contact haulers and applied by the farmers using equipment supplied by NRWWTP. Farmers are currently charged up to $3.00 per ton for the material. Farmers are pleased with the quality of the material and find crop yields are improved compared with dolomitic lime application. Land application sites are monitored regularly by NRWWTP personnel to ensure compliance and quality.

Composting

Dewatered solids are transported to the nearby McGill Environmental Services composting site. Contracted arrangements between McGill and CORPUD define requirements for this contractor, including consistency with Code of Good Practice and EMS principles. McGill's handling of the solids, including co-mingling with material from other plants, involves mixing with food, yard and wood waste, storage in compost bays, storage in windrows and screening before being sent to landscapers, erosion control contractors and other wholesale users as a Class A equivalent soil amendment material ("Soilbuilder"). Operations and transportation observed were consistent with acceptable practices, including an effective electronic control system used to monitor operating conditions and keep records. McGill participates as a "stakeholder" in CORPUD communications program.

Audit Results

The processes described above were found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations.

Opportunities

- A site plan for biosolids land application could be useful in organizing and recording land application activities and controlled records could be useful in identifying trends and historical information.

- Consider rewriting the "Special Conditions for Contractors" document to include the Biosolids Policy and identify specific EMS requirements expected of contractors.
- Consider how biosolids product odor and color could be measured, even if qualitative, to enable tracking.

Audit - Communication

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 6 & 9.

Process Description

External communication occurs in regularly scheduled Stakeholder Meetings (open to any interested party), via a Biosolids Newsletter, annual performance reports and in response to inquiries and complaints from interested parties. NRWWTP personnel also provide public education about wastewater treatment at local colleges. A complaint tracking form is monitored and linked to the corrective action process. Neighbors, advocacy groups and regulators interviewed during this audit stated that NRWWTP communications have improved in recent years.

Internal communication about the biosolids program occurs in weekly staff meetings, in shift meetings and through annual EMS training discussions. A "Gainsharing" system is in place for recognizing improvement suggestions.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations.

Opportunities

- An interested party related wastewater treatment issues (e.g. nitrogen reduction) with overall plant performance, which can affect perceptions about biosolids program performance. Communication and education with this advocate about biosolids improvements could help in supporting and working with issues.
- It could be helpful to understand why minimal feedback is being received from the Biosolids Newsletter.

Audit – Competency, Awareness & Training

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 7 & 8.

Process Description

Training requirements and procedures are described in the EMS Manual, including management training (such as Leadership training) and Operator training (such as DOP awareness) and safety training. All employees must complete EMS Awareness training annually. Job qualifications are described on Job Descriptions for key positions, including Operator Certification requirements. A performance observation sheet is used to monitor operator performance and used to develop on the job training needs.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations.

Opportunities

- A "competency checklist" could be helpful in verifying continuing competency for key operating and maintenance personnel.
- The link between individual performance goals and strategic goals / objectives / targets should be formalized.

Audit – Compliance (with Legal & Other Requirements)

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 4 & 13.

Process Description

Legal requirements, including federal and state regulations and operating permits are monitored by the EMS Team members using input from reputable sources and discussions with State authorities. State authorities perform compliance inspections regularly and NRWWTP takes appropriate and timely corrective action in response to any findings. Operations are monitored continuously; including lab testing and review of operating data, to ensure 503 and permit requirements are being met. Any material not meeting requirements is retreated or sent to landfill.

CORPUD report no "other requirements" that apply to their biosolids program.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations.

Audit - Corrective and Preventive Action

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Element 14.

Process Description

The CORPUD corrective action process includes investigation of noncompliances, emergency incidents and EMS nonconformances. Causes are discussed and actions to address the cause of the deficiency are agreed upon by the Management Team. A member of the Team is assigned responsibility for ensuring the action is completed as agreed, or for discussing possible alternative actions with the Team. The process was used effectively in correcting a major nonconformance found during the initial KEMA verification audit.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations, except as noted below.

Minor Nonconformance JS&MW /06-05/ El14 Relatively few formal Corrective Actions have been reported and those in place are recent and limited in scope, indicating that the Corrective and Preventive Action process is not being fully used.

Audit - Critical Control Points

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Element 3.

Process Description

Critical control points are identified in the EMS Manual (El 3) and in a worksheet that includes environmental impacts and aspects and references operational controls at each step in the biosolids value chain. Identification of critical control points includes consideration of environmental impacts, regulatory requirements and desired quality. Critical control points identified and used by CORPUD are consistent in scope with the Manual of Good Practice.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations.

Audit - Document Control & Recordkeeping

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Element 12.

Process Description

A list of documents requiring control within the EMS and procedures for controlling these documents is included in the EMS Manual. Key documents are being reviewed and revised as necessary and are available. A list of records requiring control within the EMS and procedures for controlling these records are included in the EMS Manual. Key records are effectively controlled, including backup of databases.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations, except as noted below.

Minor Nonconformance JS&MW /06-04/ El12 Some key documents (e.g. emergency plans, some SOPs) are not being fully controlled (dated, approved, reviewed).

Audit - Emergency Preparedness

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 11 & 14.

Process Description

Several emergency plans exist for the facility, each specific to one aspect of emergency preparedness. The system is tested regularly (2 drills/yr) and results of drills discussed and changes in procedures considered or put in place as appropriate.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations, except as noted below.

Minor Nonconformance JS&MW /06-02/ El11 There are several emergency plans in place for various events, but EMS documentation does not reference all plans, making it unclear how the various emergency plans are used and relate to each other.

Minor Nonconformance JS&MW /06-03/ El11 Requirements for McGill Environmental Services state that the Emergency Operation Plan needs to be implemented, however that plan addresses only transportation situations, indicating that contractor requirements for developing emergency plans have not been fully implemented.

Audit - Goals and Objectives for Improvement

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 5 & 13.

Process Description

The Management Team has set biosolids goals that are consistent with desired EMS results stated by the Director of Public Utilities. Specific and measurable objectives are in place for achieving each goal and action plans, including responsibilities and timing, are in place for achieving the objectives / targets. Performance in achieving objectives is part of quarterly management team meeting agendas.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations, except as noted below.

Minor Nonconformance JS&MW /06-01/El5 Progress in completing action plans for achieving objectives / targets is being tracked during management reviews, however no records exist.

Opportunities

- “Objectives” and “targets”, currently listed separately, could be combined to have a combined list of objectives measurable targets.
- Establishing short and long term performance measures for key system processes, such as Communications, Corrective Action, Training, Maintenance could help in evaluating the effectiveness of those processes.

Audit - Internal Audits

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 14 & 16.

Process Description

Internal audits are scheduled to occur annually, coordinated by the EMS Coordinator. An internal audit of the complete EMS was performed in December 2005 (reported 1/06) and results were communicated to management for correction of nonconformances. An internal audit of a portion of the EMS (Emergency Preparedness) was conducted in December 2006.

Progress towards achieving goals and objectives and performance in meeting Biosolids Policy commitments has recently been assessed by the EMS Coordinator and reported at a management review meeting.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations, except as noted below.

> Minor Nonconformance JS&MW /06-08/ El16 Internal audits to date have not provided conclusions about the effectiveness in meeting policy requirements or the performance of the goals and objectives process and have not audited documentation as stipulated by the CORPUD EMS requirements.

Audit - Management Involvement and Review

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 2, 5, 7 & 17.

Process Description

The CORPUD EMS Management Review process includes regular meetings held by the Director of Wastewater to discuss current issues, quarterly management meetings to discuss EMS issues and annual meetings to prepare budgets and plans, review overall performance and develop biosolids program performance reports, including reports for regulatory agencies. The EMS Coordinator participates in these meetings and presents information concerning the effectiveness of the biosolids program, including a summary of progress towards biosolids objectives and audit results.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations, except as noted below:

> Minor Nonconformance JS&MW /06-07/ El17 Management reviews have not fully assessed the performance of management system processes.

Opportunities

- A “management of change” plan for moving to Class B biosolids could be helpful in identifying and offsetting potential problems.

Audit - Planning & Public Participation

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Elements 5, 7 & 17.

Process Description

CORPUD senior management wants to implement a biosolids EMS approach in order to go beyond regulatory compliance, ensure they have a well-received product, continue to develop reuse options, protect public health and lower biosolids production and use costs. In addition, the City Manager believes using an EMS approach will help the City maintain high standards and "be one of the best" cities nationally. These desired results are reflected in goals and objectives for the biosolids program.

The EMS Coordinator provides public input into Biosolids Program and EMS planning sessions, including goal-setting, obtained through the NRWWTP Communications Program. In addition, interested parties have opportunities for input via the website, in public meetings and in regularly scheduled Stakeholder meetings.

Audit Results

The process was found to conform to applicable EMS for Biosolids requirements and be consistent with NBP expectations.

Audit - Roles & Responsibilities

Applicable EMS Elements – The audit assessed this biosolids program process for consistency with expectations and requirements of applicable EMS Elements, particularly Element 7.

Process Description

The WWTP Superintendent has overall authority and responsibility for the CORPUD biosolids program. Roles and responsibilities are assigned in Job Descriptions, and further defined for key personnel in Element 7 of the EMS manual. The Reuse Supervisor has the power to provide financial resources and personnel within the limits of the annual budget. All key personnel are aware of their responsibilities as they relate to the biosolids value chain.

Contractor roles are defined in contract documents and the EMS manual, and contractors are aware of their responsibilities as they relate to the biosolids value chain.

Audit Results

This process was found to conform to applicable requirements of the EMS for Biosolids standard and NBP expectations.

Opportunities

- Consider rewriting the "Special Conditions for Contractors" document to include the Biosolids Policy and identify specific EMS requirements expected of contractors.

APPENDICES

a) List of Interview Participants

The following personnel participated in this audit. Where necessary, other employees provided additional explanations.

NRWWTP

Burrell Brock	Industrial Pretreatment Coordinator
Dale Crisp	Public Utilities Director
Marla Dalton	Laboratory Supervisor
Winslow Davis	Operations Supervisor
Don Edwards	Residuals Coordinator
Marti Gibson	Environmental Coordinator / EMS Coordinator
Terry Homan	Plant Maintenance Supervisor
Jesse Luper	Land Management Supervisor
T.J. Lynch	NRWWTP Superintendent
Neil O'Driscoll	Operator
Wesley Voyles	Operator 2
Tim Woody	Reuse Superintendent

Other

J. Russell Allen	City Manager, City of Raleigh
Steve Cockman	Sales Manager, McGill Environmental Services
Joan Edgington	Neighbor / interested party
Randy Edwards	Participating Farmer
Judy Garrett	Environmental Chemist, NCDENR
Mike Hom	Environmental Engineer, EPA Region 4
Lewis Jackson	Transportation Manager, McGill Environmental Services
Dean Naujoks	Upper Neuse Riverkeeper, Neuse River Foundation
Ray Weaver	Participating Farmer
Freddy West	Driver, Always Trucking

b) List of Documents Reviewed (by EMS Element)

1. Documentation of EMS for Biosolids

EMS Manuals (8/06, revised 11/16/06)

2. Biosolids Management Policy

Biosolids policy (EMS Manual El 2 + posted throughout plant)

3. Identification of Critical Control Points

List of critical control points (EMS Manual)

4. Legal and Other Requirements

NRWWTP Investigation / Resolution chart (monthly)
NCDENR permit NC0029033 (6/5/00)
DNDENR Class A permit WQ0011583
Biosolids land application permit WQ0221730 (10/15/04)
Div Solid Waste compost permit (12/6/04)
Class B Biosolids Land Application Permit No. WQ0001730, issued to City of Raleigh by State of North Carolina, dated 10/15/06
Class A Biosolids Use Permit No. WQ0011583, issued to City of Raleigh by State of North Carolina, dated 5/12/00

5. Goals and Objectives for Continual Improvement

WWTP budget report
NRWWTP objectives & targets (11/06)

6. Public Participation in Planning

7. Roles and Responsibilities

Job Descriptions (various)
Lines of authority (EMS Manual 7.2)
Job descriptions (Plant Operator, Equipment operator, chemist)

8. Training

Training records (various)
Operator Certificates (various)
Performance observation notes (various)
Activity Attendance Report (training) dated 11/3/06
2006 Safety Training Calendar
Spreadsheet – “Ability to Operate Equipment”

9. Communication

Water collection & treatment system reports (2005/6, 2004/5)
Newsletter vol 2 issue 3 (Q1/06)
Onsite land management monthly report (various)
Monthly activity report (9/06)
MSDS (various)
City of Raleigh website (+ biosolids EMS site)
Raleigh Plus product brochure 2/1/06

City of Raleigh Request Form Class A Biosolids 9/21/06
City of Raleigh Industrial Waste Survey for Christian and Assoc. dated 6/6/06
Industrial Survey Short Form for Closure Medical dated 6/26/06

10. Operational Control

Raleigh Plus product label
Pathogen & Vector Attraction Reduction Form (2/9/06)
DOPs (various)
Dewatering SOP binder (not dated)
Special conditions for contractors (EMS Manual 8.1, 10/06)
Mainstar Work Order database
Monthly prev maint schedule (3/18/05, 9/6/06)
Maintenance work orders (various)
EMS Manual in Thickening Building
OPS 32 data management system (on-line)
Neuse River Field/Filter Form dated 11.27/06
Master Shift Logbook
Tertiary Filtration Units Logbook 11/23-27/2006
Allocation Table (pretreatment) – 2/3/06

11. Emergency Preparedness and Response

NRWWTP Emergency Response Plan (Safety Manual) 06/05
Handling of Hazmat Emergencies (10/90)
Bloodborne pathogen control plan (not dated)
McGill Spill control plan
Emergency Evacuation Plan, dated 8/04
Comprehensive Spill Containment Report – Process Chemicals, dated 12/9/05
Comprehensive Spill Containment Report – Diesel Fuel/Petroleum Products, dated 12/05
City of Raleigh Neuse River WWTP Safety Manual, dated 10/12/95

12. EMS Documentation, Document Control and Recordkeeping

13. Monitoring and Measurement

DWQ Lab Certification Inspection (Mar 1/06) & Corrective action (4/7/06)
NCDENR compliance inspection report 12/8/05
Soil test report 1/12/06)
Biosolids tracking report (1/05)
Biosolids land application report (2/10/06)
Dewatering Plant log book (ongoing)
Laboratory analysis reports (various)
Batch info (various)
City of Raleigh Neuse River Wastewater Lab Report 11/7/06

14. Nonconformances: Preventive and Corrective Action

Biosolids EMS Corrective & Preventive Action form (EMS Manual 14.1)
Corrective action report 11/02/06
Corrective action from internal audit (6/19/06)
High flow event notes 11/22/06
Corrective Action Reports (9/06, 11/16/06)

15. Biosolids Program Periodic Performance Report

Biosolids summary report (9/06)

16. Internal EMS Audits

Internal audit report (Jan 06)
Emergency Preparedness process internal audit report (Dec 06)

17. Periodic Management Review of Performance

Leadership Group mtg report (6/14/06)
Management review mtg record 11/10/06
EMS team mtg minutes (various)

c) Desk Audit Findings (by EMS Element)

The following "observations" were made during the review of CORPUD EMS Documentation (EMS Manual dated August 2006). Results of that review were reported to CORPUD September 30, 2006. Observations can lead to EMS nonconformances if not corrected.

Element 1 – Documentation of EMS for Biosolids

Observation

- It is not clear what level of authority is required to approve the EMS Manual and/or it's section

Additional Comments

- There are a number of historical references in the EMS Manual about how the EMS was developed. These are unnecessary and will become dated as the EMS matures.
- The title and authority level of the individual "Gibson" approving each section should be referenced.

Element 2 – Biosolids Management Policy

Observation

- There are at least 3 different versions of the biosolids policy, leading to confusion as to which applies and what management commitments actually are.
- The approved Council resolutions in the EMS Manual do not provide policy to follow the principles of the Code of Good Practice.

Additional Comments

- From the way El 2 is written, it is not certain what the "full version" policy includes, so it is not certain that this policy includes commitment to uphold principles of Code of Good Practice
- It is not clear how the Biosolids Management Policy is incorporated into biosolids programs, plans and procedures.
- It is not clear how CORPUD will know they have the "best" program, as stated in the Policy.

Element 3 – Critical Control Points

Observations

- None

Additional Comments

- Justification is required for omitting several critical control points suggested in MoGP guidelines.
- Operational controls noted in table 3.3 need clarification. They do not appear to be operational controls.
- Environmental impacts should probably include the word "potential".

Element 4 – Legal & Other Requirements

Observations

- It is not clear how "other" requirements are identified and tracked.

Additional Comments
- The list of applicable legal requirements should reference applicable DOT regulations.
- Does including "future regulatory issues" in list of legal requirements mean that these are the only requirements being tracked?

Element 5 – Goals & Objectives for Continual Improvement

Observations

- The distinction between biosolids goals and biosolids objectives is not clear.
- Some "goals and objectives" are not sufficiently measurable (e.g. "improve community awareness", "reduce complaints")

Additional Comments
- Does including "future regulatory issues" in list of legal requirements mean that these are the only requirements being tracked?
- It is not clear how goals, objectives and action plans are integrated into biosolids management activities following budgeting.

Element 6 – Public Participation in Planning

Observations

- It is not clear (from El 5 or 6) how interested party input is considered in developing and updating biosolids program goals and objectives.

Additional Comments
- It is not clear how the Public Participation Plan made "proactive" (it seems reactive).
- It is not clear how CORPUD ensures the Public Participation Plan is consistent with commitments to the Code of Good Practice.
- Including the list of interested parties in the EMS Manual may require frequent updating of the manual.
- El 6 begins by referencing "interested parties", however describes the planning for public participation only. Are interested parties and the public the same?

Element 7 – Roles & Responsibilities

Observations

- None

Additional Comments
- Lines of authority should be described.

- It is not clear how / who authorizes / selects / appoints the EMS Coordinator, particularly if the EMS Coordinator also approves the EMS Manual.
- It is not clear how biosolids program responsibilities relate to EMS responsibilities.
- It is not clear who is responsible for assessing contractor performance.

Element 8 – Training

Observations

- None

Additional Comments
- It is not clear how competency is determined.
- It is not clear what specific training in biosolids activities is required other than "EMS Policy" and "EMS Awareness". Note that the Policy is referred to incorrectly.
- It is not clear how Attachment 8.1 ("Special Conditions") is used.

Element 9 – Communication

Observations

- The external Communications Program described in EMS Manual El 9 does not reference communication with interested parties other than the public.
- Contractor roles and responsibilities for external communication as part of the Communications Program are not specifically stated.
- It is not clear from the Communications Program in El 9 how the biosolids policy, applicable legal and other requirements, biosolids goals and objectives and third party audit results are communicated and made available to interested parties.

Additional Comments
- It is not clear how CORPUD determines if its Communications Program is consistent with local circumstances, the method of biosolids management, public communications history, and degree of current interest in its biosolids management activities.

Element 10 – Operational Control of Critical Control Points

Observations

- Several different methods of controlling operations are noted in the purpose of EMS Manual El 10, however only DOPs and O&M procedures are described, leading to confusion about what operational controls apply.

Additional Comments
- Several "Operational Controls" noted in EMS Manual Attachment 3.3 are not referenced in El 10.
- It is not clear how legal and other requirements are incorporated into operational controls.
- It is not clear how best management practices are considered when developing operational controls.
- How are contractors working with biosolids required to implement operational controls?

- It is not clear how maintenance, treatment technology and process control systems are included in operational controls.

Element 11 – Emergency Preparedness & Response

Observations

- No specific requirement exists for testing / evaluating the effectiveness of emergency plans.

Additional Comments
- None

Element 12 – EMS Documentation, Document Control & Recordkeeping

Observations

- None

Additional Comments
- It is not clear from EMS Manual El 12 what documents other than the EMS Manual require control or how these are controlled.
- There is no written procedure for controlling biosolids program records.
- Some necessary records do not appear to require control, such as inspection results, performance reports, roles & responsibilities
- It is not clear what contractor documentation, document control and recordkeeping requirements are.

Element 13 - Monitoring & Measurement

Observations

- None

Additional Comments
- It appears that both goals and objectives are monitored quarterly. Is it necessary to measure goals that frequently (goals are desired long term results, objectives are intended short term accomplishments)?
- It is not clear from EMS Manual El 13 what “measurements” need to be taken or how compliance is monitored. Are these described in the DOPs?
- It is not clear from EMS Manual El 13 what monitoring / measurement requirements apply to contractors.

Element 14 – Nonconformances: Corrective & Preventive Action

Observations

- None

Additional Comments
- More explanation needed for not doing corrective action for minor nonconformances found during routine monitoring (this violates NBP requirements).

- Although referenced in El 4, procedures for investigating and correcting noncompliances should be included in El 13 or 14.
- It is not clear how progress in correcting nonconformances is tracked.
- It is not clear what happens if corrective action does not progress as intended.

Element 15 – Biosolids Management Program Performance Report

Observations

- None

Additional Comments
- Why is the Biosolids Report specified as being issued annually? It may be desired more frequently.
- The intended content of the Biosolids Management Program Report does not include contractor performance.

Element 16 – Internal EMS Audit

Observations

- Conducting internal audits in alternate years (i.e. years when third party audits may not occur) is inconsistent with CORPUD EMS Management Review requirements.

Additional Comments
- Audit reports should be submitted to management of areas audited in addition to other managers.
- Except for the first internal audit, it is not clear how the scope of internal audits is determined.
- It is not clear how important events / situations that CORPUD feels need to be assessed are included in internal audits (third party audits following Verification cover a predetermined part of the system).
- It is not clear how contractors are included in internal audit scope. Is audit of contractors every 4th year sufficient?
- Requirement for recording lead auditor(s), qualifications, roles and responsibilities of auditors is not described in the Internal Audit Program (EMS Manual El 16).

Element 17 – Periodic Management Review of Performance

Observations

- The agenda for Management Reviews stated in EMS Manual El 17 does not appear to include relevant communications from external parties, results of audits and compliance assessments, status of corrective and preventive action, changing circumstances and recommendations for improvement.

Additional Comments
- None

END OF REPORT