National Biosolids Partnership

Biosolids EMS Verification Audit Report

City of Lawrence Wastewater Treatment Plant,

Lawrence Kansas

Audit Report Date: October 12, 2005

Audit Conducted By:

KEMA Quality, Inc. – Chalfont, PA
Auditors: Jon Shaver, Biosolids EMS Lead Auditor
Dale Scherger, Biosolids Auditor

Audit Dates:

Phase 1 – September 14 - 16, 2005
Phase 2 – September 19 - 22, 2005

Approvals:

Final Approval By: Pierre Salle, KEMA Quality, Inc.

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1. SUMMARY

KEMA-Registered Quality Inc. (KEMA) has conducted an independent Verification Audit of the Biosolids Environmental Management System (EMS) used by the City of Lawrence Municipal Wastewater Treatment Plant. The purpose of the audit was to verify that the City of Lawrence's EMS conforms to 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 conducted as documented and the EMS is producing desired outcomes.

A. Audit Scope and Methodology

The scope of the Biosolids EMS audit encompasses the entire biosolids value chain (pretreatment, collection and treatment, stabilization, storage and transportation and end use / disposition), with special attention to practices and management activities that directly support biosolids-related operations, processes, and activities.

Specifically, the scope of this audit included:

- Review of EMS Documentation being used by the City of Lawrence.
- Audit of EMS processes used by the City of Lawrence in managing their biosolids activities covering all requirements of the 17 EMS Elements. The audits were performed onsite at the City of Lawrence Wastewater Treatment Plant and two land application sites near Lawrence and included interviews with State regulators and other interested parties.
- Transaction tests to assess the functionality of the EMS
- Examination of outcomes the City of Lawrence is achieving by using their EMS.

The audit was performed in two phases. Phase 1 was conducted September 14 to 16, 2005 and included a review of EMS Documentation and audit of seven key EMS processes. Phase 2 was conducted September 19 to 22, 2005 and included audits of all remaining EMS processes, transaction tests, interested party interviews and examination of EMS outcomes.

Each audit was performed by interviewing key persons involved in the process, observing practices in place, and reviewing pertinent documents and records. Representative interested parties were interviewed.

B. Summary of Audit Findings

<u>EMS Strengths</u>

KEMA noted the following strengths in the City of Lawrence Biosolids EMS.

- Pride in workmanship, housekeeping and doing effective work is evident throughout the plant.
- Management is committed to establishing an effective management system and a strong teamwork approach is being used to do this, with input from several areas of the plant.
- Trend analysis capability is being implemented and used for analyzing several important parameters and management understands the value of trends in initiating improvements and preventive action.

- An effective internal communications system is in place and several good methods for external communication are used.
- A well-developed SCADA system is in place for monitoring and controlling operations at the plant, with the ability to monitor the system from various locations.

EMS Outcomes

Performance improvements (outcomes) that have been achieved by the City of Lawrence in improving performance in managing biosolids materials since implementation of their EMS began in 2002 are summarized below. Details are described in Section 2 of this report.

- Improved digester operation and flow pattern
- Improved grit screening equipment
- Increased operations and maintenance staff instrumentation skills
- Addition of roof on biosolids storage area
- Improved biosolids quality consistency
- Employee responsibilities / accountabilities improvement
- Sustained strong relationship with local farmers

Nonconformances

During this audit, KEMA found no major nonconformances and eleven (11) minor nonconformances with respect to the audit criteria. These nonconformances are described in Section 3 of this report (Detailed Audit Results).

The City of Lawrence has prepared a Corrective Action Plan for each minor nonconformance identified during the audit. KEMA's Lead Auditor has reviewed those plans and found them acceptable.

Opportunities for Improvement

KEMA noted several opportunities for improvement in the City of Lawrence biosolids EMS. These opportunities are noted 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 Lawrence for managing its biosolids activities:

> *"The City of Lawrence Municipal Wastewater Treatment Facility has been independently verified by KEMA 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

The City of Lawrence has agreed to submit action plans for correcting nonconformances identified in this report to KEMA's Lead Auditor within 30 days. KEMA and the City of Lawrence have agreed that the effectiveness of the corrective action taken in response to those nonconformances will be verified by KEMA before or during the next interim audit, which will occur within 12 months of the date of this report per NBP requirements.

2. AUDIT DETAILS

A. Local Agency Details

Agency Name: City of Lawrence Municipal Wastewater Treatment Facility

Facility: City of Lawrence Wastewater Treatment Plant, Lawrence Kansas

Volume of Wastewater Treated = 12.5 MGPD

Biosolids Produced = 4,500 wet tons per year (Class B)

Number of Employees = 25

Biosolids use / Disposition Sites Audited

Land application sites (2) near Lawrence

Contractors Audited

Nutri-Ject Inc.

B. Audit Team

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

Jon Shaver – Biosolids EMS Lead Auditor
Dale Scherger – Biosolids Auditor

KEMA asserts that the relationship that our firm and our auditors have with the City of Lawrence is completely independent and meets criteria established by the National Biosolids Partnership for Third Party Audit Companies and Third Party Auditors. We also assert that the auditors who conducted this audit on our behalf are qualified for their roles through certification by the National Biosolids Partnership.

C. Reference Materials

The following documents were used as references during this audit:

City of Lawrence Wastewater Treatment Plant EMS Manual (September 1, 2005)
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

D. Definitions of Terms

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

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

Opportunities (for Improvement) – suggested improvement 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. AUDIT RESULTS

A. Summary of Results by EMS Element

EMS Element	EMS Status (@ 9/22/05)	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	Minor Nonconformance	Nonconformance 05-01 (minor) Applicable operational controls corresponding to identified critical control points are not sufficiently specific (e.g. "Operations and Maintenance"). Nonconformance 05-02 (minor) Identified operational controls corresponding to the Class A unregulated product (per List of Critical Control Points) do not reflect actual practice.
4. Legal and Other Requirements	Conforms	None
5. Goals and Objectives for Continual Improvement	Minor Nonconformance	Nonconformance 05-03 (minor) Some biosolids objectives, targets and action plans do not clearly identify a sufficiently measurable or specific desired result.
6. Public Participation in Planning	Conforms	None

EMS Element	EMS Status (@ 9/22/05)	Nonconformances (corrective action plan approved for each nonconformance)
7. Roles and Responsibilities	Minor Nonconformance	Nonconformance 05-04 (minor) Contractor roles and responsibilities noted in EMS Manual procedure 7, attachment 7A are not consistent with several contractor responsibilities noted throughout the EMS procedures.
8. Training	Minor Nonconformance	Nonconformance 05-05 (minor) Training is not being performed as stated in the EMS Manual (008). The new Operator Training Program is not yet completely implemented.
9. Communication	Conforms	None
10. Operational Control of Critical Control Points	Minor Nonconformance	Nonconformance 05-06 (minor) Operating procedures, monitoring requirements and process description for the revised unthickener process are not correctly stated in the electronic procedure system. Nonconformance 05-07 (minor) Operational controls required for land application contractors are not clearly defined within the City's EMS, leading to uncertainty about how related operations are controlled.
11. Emergency Preparedness and Response	Conforms	None
12. EMS Documentation, Document Control and Recordkeeping	Minor Nonconformance	Nonconformance 05-08 (minor) Some important documents are not adequately controlled. For example, many attachments in the EMS Manual are not identified or dated, the written Operator Training Programs, Emergency Operations Plan, key contractor document (Nutri-Ject General Safety) are not dated or approved.
13. Monitoring and Measurement	Conforms	None
14. Nonconformances: Preventive and Corrective Action	Minor Nonconformance	Nonconformance 05-09 (minor) Written corrective action procedures (EMS Manual Procedure 14) do not reflect actual practices for investigating deficiencies, determining causes and assigning responsibility and timing for corrective and/or preventive action.

EMS Element	EMS Status (@ 9/22/05)	Nonconformances (corrective action plan approved for each nonconformance)
15. Biosolids Program Periodic Performance Report	Conforms	None
16. Internal EMS Audits	Minor Nonconformance	Nonconformance 05-10 (minor) The internal audit process does not include assessment of whether biosolids goals and objectives are being effectively met and written procedures do not reference that assessment or how effectiveness of meeting Biosolids Policy commitments is considered.
17. Periodic Management Review of Performance	Minor Nonconformance	Nonconformance 05-11 (minor) Management reviews were done too recently to determine if recommendations for action resulting from the reviews is being effectively implemented.

B. Examination of EMS Outcomes

The environmental management system being used by the City of Lawrence is an integral part of the way all biosolids activities are managed. In that sense, the EMS has contributed significantly to the following improvements in biosolids activities since it's implementation began approximately 3 years ago.

Quality Biosolids Practices

Minimal staff increase occurred following the 2003 plant expansion. This expansion in employee responsibilities and accountabilities has led to improved productivity, better operations personnel and greater staff satisfaction. Productivity improvements are estimated to be approximately $10 to $15K per MGD capacity. Indirect costs lowered through improved plant performance.

A roof was installed on the biosolids storage shed (2005) that has resulted in dryer solids, less spillage, better housekeeping and lower hauling volume. Reduced transportation costs estimated to be $2 per ton ($10K / year at current volume).

Instrumentation skills of Operations and Maintenance staff have been significantly improved, leading to increased mechanical reliability, improved emergency response capability, reduced risk of noncompliance and less reliance on outside contractors. Savings in reduced use of outside contractors are estimated to be at least $150K / year.

Regulatory Compliance

Several initiatives have been implemented to further improve biosolids quality, including changed digester operations and flow pattern and installation of improved belt press equipment. This has led to a consistently better quality product (20% quality improvement), improved operating reliability,

lower per ton transportation cost and reduced risk of noncompliance (solids / pathogens lowered further below regulated limits). This has resulted in continuing compliance and at least $100K savings in labor, repairs and material usage cost.

Environmental Performance

New grit screening equipment has been installed that has led to reduced organics being separated with grit. This has resulted in beneficially reuse of those organics instead in landfill that has resulted in approximately $25K/year reduced disposition cost. It has also resulted in increased methane availability for fuel.

Relations with Interested Parties

A strong, positive relationship with local farmers is being sustained, leading to ample land capacity and flexibility for handling the City's biosolids. This is resulting in continuing beneficial reuse and lower costs than other alternatives.

C. Detailed Audit Findings

The auditors made the following observations during this audit. This description has been prepared sequentially to parallel the 17 EMS Element. Actual audits consisted of process audits, which often involved audit criteria for several EMS Elements for each process.

Element 1 – Documentation of EMS for Biosolids

Process Description

EMS procedures and practices are described in the City of Lawrence EMS Manual, which is organized to correspond sequentially to the elements of the EMS for Biosolids standard and available on the City of Lawrence website (http://www.lawrenceutilities.org/Biosolids.shtml).

Details of the EMS Documentation Review are described in the appendices of this report. The City of Lawrence addressed all of the "observations" noted in the Documentation Review and satisfactorily updated their EMS Manual prior to completion of this audit.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations.

Opportunities

The EMS Manual on the website is a rather large file and takes several minutes to download, which may make it difficult for some persons to retrieve it.

EMS procedures are somewhat complex. It may be preferable to describe EMS procedures in a less complex manner so they are easily referenced and understood.

Describing the EMS as a series of inter-related processes, with inputs and outputs, may be easier to understand how the system is used to manage actual practices.

Element 2 – Biosolids Management Policy

Process Description

The City of Lawrence Biosolids Management Policy was authorized by the City Manager on 11/24/04. A description of the policy and its approval was televised publicly in November 2004. The policy is documented in the EMS Manual and available to employees, contractors and the public via the City of Lawrence website. The policy commits the City of Lawrence to operate in accordance with the principles of the NBP Code of Good Practice in managing biosolids activities and makes additional commitments consistent with that code.

Audit Results

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

Opportunities

It may be easier to refer only to the commitments stated in 3.0 of the full policy document for communicating and training purposes.

Including letters of commitment between NBP and the City of Lawrence regarding biosolids EMS program participation as part of the policy section in the EMS Manual is unnecessary and could lead to over-complication.

Element 3 – Critical Control Points

Process Description

Critical control points for the City of Lawrence biosolids operations are identified in a table in Appendix A of the City of Lawrence Biosolids EMS Manual (dated 9/13/05). This table identifies critical control points for each value chain category and includes information about significant environmental impacts, applicable legal and other requirements, operational controls and responsible individuals. The identified critical control points are consistent with the NBP "Manual of Good Practice".

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations, except as noted below.

Nonconformance 05-01 (minor) Applicable operational controls corresponding to identified critical control points are not sufficiently specific (e.g. "Operations and Maintenance").

Nonconformance 05-02 (minor) Identified operational controls corresponding to the Class A unregulated product (per List of Critical Control Points) do not reflect actual practice.

Opportunities

Prioritizing operational controls according to the significance of environmental impacts at the critical control point could help in determining the frequency of review / check on those controls.

There was some indication that Maintenance was not fully involved in developing critical control points and related environmental impacts and operational controls. Full involvement of all relevant functions should be done when determining this fundamental information.

Element 4 – Legal and Other Requirements

Process Description

The Residuals Coordinator tracks and identifies regulations and permits that apply to the City of Lawrence operations and biosolids product and keeps records of these requirements. A comprehensive list of regulatory requirements is included as Attachment 4A in the EMS Manual. The EMS procedure notes that no "other" requirements exist. Communications from regulators and national and State associations are used to keep information about regulations current. A management of change procedures, included within Section 4 of the EMS Manual, is used to implement new / changed legal requirements.

A "transaction test" was performed to determine how the EMS responded to a new legal requirement. The legal/regulatory tracking system was demonstrated to be effective based on the recent decision by EPA not to regulate dioxin as part of the Part 503 rules. The Biosolids coordinator was familiar with EPA's consideration of the regulatory change and initiated communication with management identifying this potential. The regulatory process was tracked and the facility implemented a base line testing program in advance of the EPA decision so that it would be prepared should a regulatory change have occurred. In this case, the regulation was not changed, but the process in place at the facility demonstrated the ability to identify and track potential regulatory changes. This transaction was verified by reviewing email correspondence and the dioxin data that was generated.

Audit Results

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

Opportunities

Limiting the list of applicable legal and other requirements (EMS Manual procedure 04, Attachment 4A) so it includes only those requirements directly related to biosolids management could help in controlling and tracking these requirements.

Element 5 – Goals and Objectives for Continual Improvement

Process Description

A "Master Plan" is used as a basis for determining annual budgets, including overall goals and objectives. Biosolids Goals are developed separately and reviewed by the Assistant Director to ensure they are consistent with the Master Plan goals. The documented biosolids "goals and objectives" include an action plan and responsibilities, resources needed and target dates.

The Residuals Coordinator maintains a spreadsheet for monitoring progress towards achieving biosolids objectives.

The Residuals Coordinator participates in developing the biosolids objectives and ensures public concerns are represented since she is also directly involved in public communications (see Element

6). The 2005 Goals are also posted on the City of Lawrence website to allow comment from interested parties.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations, except as noted below.

Nonconformance 05-03 (minor) Some biosolids objectives, targets and action plans do not clearly identify a sufficiently measurable or specific desired result.

Opportunities

Although progress towards biosolids goals and objectives is reported to interested parties (Annual Performance Report), it could help in communicating direction if these objectives were made available at the beginning of the applicable period.

If planning to implement an EMS throughout the wastewater treatment plant (i.e. not only biosolids), it would be helpful to define the terms “goals”, “objectives”, “targets”, “plans” and “programs” so they are used consistently.

Element 6 – Public Participation in Planning

Process Description

Planning for developing the EMS and developing biosolids goals and objectives is discussed at City Commission meetings that are open to the public. The Residuals Coordinator (also EMS Coordinator) communicates directly with regulators and also receives relevant incoming communications from the public, including letters and phone calls, plant tours and membership in community associations. Input received about biosolids matters is discussed during management meetings and staff meetings. The Residuals Coordinator maintains an interested party list and communicates proactively with persons on this list regarding the biosolids EMS.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations.

Opportunities

Considering input from interested parties in advance, rather than reactively, could help in preparing EMS changes and developing biosolids goals and objectives to address public issues.

Element 7 – Roles and Responsibilities

Process Description

Responsibilities and qualifications for individual job tasks are noted in Job Descriptions prepared for all City employees. EMS responsibilities are noted in individual EMS procedures and summarized in Section 7 of the EMS Manual. Additional duties and responsibilities are assigned in staff meetings. Contractor responsibilities are defined in Service Agreements with the contractor and described in applicable sections of the EMS Manual and summarized in a table within Element 7 of the manual.

Assignment of EMS Coordinator responsibilities to the Residuals Coordinator and a description of those responsibilities are noted in Element 7 of the EMS Manual. Resource requirements are identified and approved in annual budgets and further discussed at monthly manager meetings.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations, except as noted below.

> Nonconformance 05-04 (minor) Contractor roles and responsibilities noted in EMS Manual procedure 7, attachment 7A are not consistent with several contractor responsibilities noted throughout the EMS procedures.

Opportunities

None

Element 8 – Training

Process Description

Training requirements and procedures are described in EMS 008 and an "Operational Training" summary is included as EMS Manual, Attachment 8A. A new "Operations Training Program" is being implemented that includes progressive training for all Operators. New employees / job responsibilities receive 6 month probation where they are supervised on the job to determine competence. Performance reviews are conducted annually, with training needs identified.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations, except as noted below.

> Nonconformance 05-05 (minor) Training is not being performed as stated in the EMS Manual (008). The new Operator Training Program is not yet completely implemented.

Opportunities

None

Element 9 – Communication

Process Description

Internal communication about the EMS, including overall requirements and individual responsibilities, occurs periodically during staff meetings. Employee representatives participated in developing the EMS and in internal audits.

Proactive external communication occurs through brochures, plant tours, news releases, television broadcasts of commission meetings, the City's website and in various presentations made by management. The Residuals Coordinator responds to relevant communications received from external interested parties and records these on a "Communications Log". An interested party list

has been developed and is constantly expanding for use in communicating information about the City's EMS.

The land application contractor (Nutri-Ject) provides training to their personnel in handling complaints from the public and refers all such complaints to City of Lawrence.

The State Regulator noted satisfaction with communications received from the City related to biosolids activities, particularly the performance data being sent to him. Local farmers expressed confidence in the City's biosolids activities. A neighbor near the wastewater treatment plant noted that the City has responded satisfactorily to his requests, but was unaware of the EMS program.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations.

Opportunities

Increase communication of EMS information, such as posting environmental performance results and management review minutes, could lead to more employee participation and identification of improvement opportunities.

The "interested party" list could be expanded to include neighbors and additional persons who have expressed interest in the biosolids operation for more effective communications.

It could be helpful to identify and prioritize how each method of proactively communicating with the public is used in order to measure the effectiveness of each method.

Element 10 – Operational Control of Critical Control Points

Pretreatment

Identified critical control points and operational controls for this process are consistent with the National Manual of Good Practice. The majority of incoming flow is from residential / commercial sources and although not regulated incoming flow is tested daily and results communicated to operators. Significant industrial users are controlled in accordance with City of Lawrence sewer use regulations and permitted every 5 years. The Water Quality Manager manages the pretreatment process and is part of the management team for the plant and involved in management meetings and EMS audits.

Wastewater Treatment

The facility uses screens and grit removal to separate large debris and inorganic material such as plastic, sand, etc. that could impact downstream wastewater treatment equipment and degrade the biosolids quality. Wastewater is then treated in primary clarifiers to settle suspended solids prior to the biological treatment process. After primary treatment, the facility uses activated sludge biological treatment to remove dissolved organics and nutrients. Secondary clarifiers remove organic biomass generated in the aeration basins. Biosolids from the secondary clarifier are either returned to the aeration basins or are wasted to dissolved air flotation unit (DAF).

Operational controls are in place for the primary treatment system (screening and grit removal, and primary clarification) and for the secondary treatment system (activated sludge and secondary

clarification). The operational controls are consistent with the National Manual of Good Practice. Visual observations of the critical control points, interviews with operators and management, and inspection of the procedures documented in the Lawrence Electronic Operational and Maintenance Manual (LEOMM) were used to confirm the operational controls were in place. Operators were very knowledgeable of the treatment processes and the impacts these processes can have on the biosolids quality. Operators were familiar with the operating procedures and how to find the written procedures and process descriptions that are needed to control the wastewater treatment systems. Specific SOP's related to the primary and secondary treatment processes are stored in the electronic system (LEOMM) and were reviewed online. The SCADA system collects operational monitoring data from all parts of the wastewater treatment system and displays the monitoring data on several computers located throughout the plant. Supervisors can access process control data from remote locations. The measurement and monitoring systems, along with the LEOMM documentation system, were found to be excellent sources of data and information to ensure good operational control.

Solids Stabilization

Operational controls are in place for the biosolids stabilization processes and are consistent with the National Manual of Good Practice. Visual observations of the critical control points, interviews with operators and management, and inspection of the procedures documented in the Lawrence Electronic Operational and Maintenance Manual (LEOMM) were used to confirm the operational controls were in place. Operators were very knowledgeable of the treatment processes, the impacts the digester and filter press can have on the biosolids quality, and were familiar with the operating and monitoring procedures. Specific SOP's related to the digester operation were reviewed in the LEOMM system. The digester operating parameters, especially temperature, time (based on flows and solids levels), and pH are monitored at several points. All critical instruments have redundant locations for measurement and check on calibration.

There is a small laboratory in the filter press building (in addition to the main lab) that is used by the filter press operators to monitor the biosolids dewatering operation. Operators measure the percent moisture and solids content during the filter press runs, which provides data to verify biosolids quality (solids content) and/or to allow process adjustments (e.g. polymer feed rates) to be made as the biosolids are dewatered. The measurement and monitoring systems, along with the LEOMM documentation system were found to be excellent sources of data and information to ensure good operational control.

Solids Storage and Transportation

Dewatered biosolids are transferred from the belt presses by conveyor to an above grade (bottom and sides are concrete) storage area. The storage area is covered with a fixed roof to shield the biosolids from rain and reduce the impact on biosolids quality (moisture content). The elimination of rainwater in contact with the dewatered biosolids also helps to minimize odor from the biosolids storage area.

Class B biosolids in the storage area are tested in accordance with Federal regulations prior to their release for land applications. The frequency is based on the annual tonnage produced. These measurements are in addition to controlling the biosolids digester contact time, thus providing a redundant set of monitoring and measurements to ensure biosolids quality and regulatory compliance. Records are maintained.

A small amount of Class A biosolids (5 to 10% of yearly biosolids production) is produced for distribution to the public from a nearby storage area. The material is tested and handled in accordance with regulatory requirements.

The facility was not transporting biosolids during the audit, so it was not possible to observe the loading and transportation operation. Transportation is provided by the land application contractor, using either the contractor's equipment or subcontracted to a local trucking firm. One of the trucks used for the last land application period was inspected and found to be in appropriate condition for biosolids transportation. A driver interviewed was knowledgeable of the issues involved in biosolids transportation and procedures to follow in the case of a spill, and confirmed that the facility was following the operational controls described for transportation. The facility procedures include specific training of drivers before each biosolids application period, and providing the drivers with a package of information on biosolids handling procedures and emergency contact information. The Residuals Coordinator designates specific transportation routes for each land application location. Based on the interviews and equipment inspection, the transportation process appears to follow the Manual of Good Practice and meets or exceeds the designated operational controls.

Evening Shift Audit

An audit of an evening shift confirmed that established operational controls are followed during evening shift operation. The operator was aware of the EMS and able to quickly access operating procedures.

Maintenance

Maintenance procedures are documented in the plant O&M Manual. A "work request" system is used to identify and prioritize maintenance work. A preventive maintenance system is in place and records kept and trends analyzed. Equipment manufacturers' information is maintained, including recommended maintenance procedures. Personnel qualifications are reviewed and approved by the Maintenance Manager, including on the job training. The Maintenance Department has a goal to "better control maintenance parts inventory". Records clearly demonstrate equipment maintenance history. Work order procedures are in place, understood, and work effectively.

Biosolids Land Application

City of Lawrence biosolids are applied on local agriculture land on a campaign basis. A contractor (Nutri-Ject Inc.) is used to apply the solids, although the contractor admitted to having very few written procedures. No application was occurring during this audit. Farmers interviewed expressed satisfaction with City of Lawrence responsiveness and service and noted willingness to take more material if available. Inspection of areas where biosolids had recently been applied showed no adverse effects. The contractor's application data is reviewed by the City of Lawrence for compliance and regulators interviewed expressed satisfaction with report results.

Audit Results

Each of the processes described above was found to conform to applicable requirements of the EMS Elements and meet NBP expectations, except as noted below.

Nonconformance 05-06 (minor) Operating procedures, monitoring requirements and process description for the revised unthickener process are not correctly stated in the electronic procedure system.

Nonconformance 05-07 (minor) Operational controls required for land application contractors are not clearly defined within the City's EMS, leading to uncertainty about how related operations are controlled.

Opportunities

A written procedure for inspecting and operating the covered biosolids storage area could help in controlling this operation.

The Maintenance Department goal to better control parts inventory could, if desired, be an appropriate goal, with related objectives and action plans, for the EMS.

Contractors involved in biosolids land application should be encouraged to follow written procedures for critical operations.

Element 11 – Emergency Preparedness and Response

Process Description

The City of Lawrence has prepared and implemented an Emergency Operations Plan (updated June 2005) for the entire plant. This plan identifies a hazard matrix and emergency procedures for potential emergencies. All employees are required to read and acknowledge that they understand this Plan. Emergency equipment is inspected by Supervisors and tested annually. Respirators, fire extinguishers, safety showers inspections are up to date. Truck drivers are reminded of emergency contacts and procedures for each biosolids load leaving the plant. An emergency exercise is being planned as part of the Douglas County emergency test (not yet done). The land application contractor has an up to date "spill prevention plan".

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations.

Opportunities

Actual events that triggered the emergency response plan / procedures can be used as tests of the procedures and investigated for possible corrective actions.

Element 12 – EMS Documentation, Document Control and Recordkeeping

Process Description

EMS procedures are documented in the EMS Manual. These procedures (and other SOPs) and records are maintained on the City's LEOMM electronic database and readily accessible.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations, except as noted below.

> Nonconformance 05-08 (minor) Some important documents are not adequately controlled. For example, many attachments in the EMS Manual are not identified or dated, the written Operator Training Programs, Emergency Operations Plan, key contractor document (Nutri-Ject General Safety) are not dated or approved.

Opportunities

Document control methods currently being used by the Water Quality Management group could be helpful as document control methods for the Wastewater Treatment group.

Element 13 – Monitoring and Measurement

Process Description

An onsite NELAP-certified laboratory is used to test incoming materials and monitor plant performance. A quality assurance program in place includes SOPs and a Quality Assurance Plan that is audited periodically by KDHE.

The Residuals Coordinator monitors progress in achieving biosolids objectives using a local spreadsheet. Any serious lack of progress is discussed at monthly management meetings. Overall performance in achieving desired results is reviewed with each individual annually.

The Residuals Coordinator inspects land application operations and contractor performance daily during applications and corrective action is monitored if necessary.

Transaction test – identification of an out of limit result in fecal coliform analysis (8/20/05) caused the management system corrective action process to activate, including investigation of causes (ongoing) and an action plan to eliminate the causes and minimize adverse effects of high fecal coliform.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations.

Opportunities

None

Element 14 – Nonconformances: Preventive and Corrective Action

Process Description

Actual practices used in identifying and correcting practices are effective, including out of limit test results and correction of internal audit findings. The practice includes investigation of cause and action to correct the immediate problem and to prevent a recurrence. As an example, this process was used to correct several observations concerning documentation made during Phase 1 of this

audit (Documentation Review) plans were prepared and implemented for nonconformances identified during that phase.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations, except as noted below.

> Nonconformance 05-09 (minor) Written corrective action procedures (EMS Manual Procedure 14) do not reflect actual practices for investigating deficiencies, determining causes and assigning responsibility and timing for corrective and/or preventive action.

Opportunities

Expansion of the same EMS corrective action process to include public complaints and incident investigations could help in correcting these problems.

Trend analysis for corrective actions can be a powerful tool in identifying recurring causes and taking preventive action to eliminate those causes.

Element 15 – Biosolids Management Program Performance Report

Process Description

A written "Annual Performance Report" describing the City of Lawrence's biosolids performance during the calendar year was prepared in August following a management review. This report includes substantial data demonstrating performance and compliance and was sent to interested parties and made publicly available through the City of Lawrence website.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations.

Opportunities

It could help in communicating direction if objectives were made available in the Performance Report at the beginning of the applicable period.

Avoiding the term "annual" in the name of the Biosolids Performance Report could help in encouraging more frequent performance reporting, if desired.

Element 16 – Internal EMS Audit

Process Description

Internal audits are scheduled to occur annually using auditors approved by the Residuals Coordinator. An internal audit of EMS conformance with requirements was performed in August 2005 and the results were communicated to management for correction of nonconformances.

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

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations, except as noted below.

Nonconformance 05-10 (minor) The internal audit process does not include assessment of whether biosolids goals and objectives are being effectively met and written procedures do not reference that assessment or how effectiveness of meeting Biosolids Policy commitments is considered.

Opportunities

Defining the internal audit process to include assessments of progress towards goals and objectives and extent to which policy commitments are met, in addition to conformance with biosolids program requirements, could help in consolidating these assessments and measuring overall EMS effectiveness.

Element 17 – Management Review

Process Description

Management reviews of biosolids performance include full management meetings held monthly (more frequently if required) and formal "management review" meetings to address requirements of the EMS standard. The Assistant Director, Residuals Coordinator, Water Quality Manager, Plant Manager and Maintenance Manager attend these meetings. A partial management review was conducted in August 2005 and a more complete review was conducted in September 2005. These reviews were recorded.

Audit Results

This process was found to conform to applicable requirements of the EMS Elements and meet NBP expectations, except as noted below.

Nonconformance 05-11 (minor) Management reviews were done too recently to determine if recommendations for action resulting from the reviews is being effectively implemented.

Opportunities

Considering management review to be a process that includes monthly management meetings as well as formal management review meetings could help improve the effectiveness of the review process.

APPENDICES

a) List of Interview Participants

John Kraft	Interested Party	Neighbor
Mark Gerard	Interested Party	KDHE (regulator)
Ralph Kitsmiller	Interested Party	Farmer
Roger Kitsmiller	Interested Party	Farmer
Christina Folsom	Interested Party	Neighbor (Zarco 66)
Scott Wienands	Vice President,	Nutri-Ject Inc. (contractor)
Chris Eckart	Operator	City of Lawrence
Kelly French	Operator	City of Lawrence
Mark Hegeman	Plant Manager	City of Lawrence
Chris Jeffress	Operator	City of Lawrence
Jeanette Klamm	Residuals Coordinator	City of Lawrence
Dave King	Maintenance Manager	City of Lawrence
Judy Regnier	Operator / Safety & Training Assistant	City of Lawrence
Robert Skeets	Truckdriver	
Shari Stamer	Water Quality Manager	City of Lawrence
Dave Wagner	Assistant Director	City of Lawrence
Carolyn Woodhead	Lab Technician	City of Lawrence

b) List of Documents Reviewed (by EMS Element)

1. Documentation of EMS for Biosolids

City of Lawrence Wastewater Treatment Plant EMS Manual (original August 6, 2005, updated Sept 12, 2005)

2. Biosolids Management Policy

Biosolids Policy dated 11/24/04

3. Identification of Critical Control Points

EMS Manual Element 3 & 10
List of Critical Control Points (9/13/05)

4. Legal and Other Requirements

Email Klamm to management group 10/17/03 re proposed EPA 503 change (dioxin)
Email from Peter Machno forwarding email from Lee Garrigan, AMSA to Jeanette Klamm describing EPA decision to not regulate dioxin and furans in biosolids
Dioxin and furan data for biosolids

5. Goals and Objectives for Continual Improvement

Goals for 2005 (LWTF website)
Goals & Objectives (rev 9/12/05)
Task Manager (Outlook)

6. Public Participation in Planning

None

7. Roles and Responsibilities

Job Descriptions – Plant Manager, Maintenance Mgr, Operator, Water Quality Technician
Agreement – Removal, Transportation, Land Application & Agronomic Management of Biosolids Project (Nutri-Ject) (signed 12-22-04)
Staff meeting minutes 5/25/05,

8. Training

Contractor training program (by J Klamm) 7/18/05
Operator Training Manual
Training records – K French (Operator) + various others

9. Communication

City of Lawrence website (www. .com)
City of Lawrence – Biosolids frequently asked questions (undated)
Biosolids Recycling WEF document HP1403
Staff meeting minutes (EMS discussion) 8/24/04, 9/28/04
Communications Log
Interested party list
Summer 2005 Land Application of Biosolids project report (undated)
Spring 2005 Land Application of Biosolids project report (undated)
Brochures (undated) – answers to questions about biosolids (environmental management system, odors, monitoring, pathogens & safety concerns)
Brochure (undated) National Biosolids Partnership EMS Demonstration Program
"The City Connection" newsletter (Nov 2004) – pages 4 & 5
May 2005 Lawrence Parks & Rec advertisement

10. Operational Control of Critical Control Points

Fecal coliform analysis 8/20/05 & letter to KDHE 8/22/04
E-mail from KDHE 9/14/05
Quality Assurance Plan (laboratory)
KDHE Audit Report (NELAP certification) 2/27/04
Laboratory SOP Manual – SOP001 (Alkalinity procedure, dated 2/12/04), SOP013 (pH procedure, rev Dec 2003)
Pretreatment sampling & guidance manual (8/98)
Wastewater survey for nonresidential establishments (4/12/05)
Class A Biosolids Fact Sheet
Nutri-Ject Systems Inc. Farm Equipment General Safety (not dated)
H&S All Purpose Spreader mftcrs info (1997)
Introduction & customer info John Deere Loader (JD544B)
Permanganate system operation MP 8007
Class A biosolids detention time log
Class A biosolids Fact Sheet for Public
Class A biosolids handling Procedure MP7003
Truck Hauling Biosolids Procedure – given to all truck drivers
LEOMM Documents
- Primary clarifier Process Description Overview
- Primary clarifier standard procedures
- Primary clarifier process control
- Secondary clarifier Process Description Overview
- Secondary clarifier standard procedures
- Secondary clarifier process control
- Digester standard procedures

Digester process control
Daily Process Discussion – electronic log written by the operators during each shift
Operations log – electronic log filled in hourly by the lead operator describing activities and process conditions
Biosolids Bunker Gate t\Tie Up Procedure – MP7006
Installation Operation Maintenance and Training Manual for the Slide Gates
Daily Rounds Check List – FRM8001
Permanganate System Operation – MP8007 – for belt filter press system
Biosolids System Controls – Not numbered – Belt filter press system control SOP
Polymer System – Not numbered – Belt filer press polymer feed system SOP
Belt Filter Presses – Not numbered – Operation of the belt filter press SOP, startup, shutdown procedures
Biosolids Feed Pump – Not numbered – Operation instructions for feed pumps to the belt filter presses
Sampling Procedures – Not numbered – Sampling procedure for the belt filter presses

11. Emergency Preparedness and Response

Truckhauling biosolids (Spill control plan, August 2004)
Emergency Operations Plan (June 2005)

12. EMS Documentation, Document Control and Recordkeeping

EMS Manual
Operator Training Program
Emergency Operations Plan

13. Monitoring and Measurement

Contractor inspection results (Nutri-Ject) 7/18/05, 7/30/05
Biosolids Loading Log (Nutri-Ject) Spring 2005
E-mail J Klam to Nutri-Ject re annual report comments (2/18/05)
Monthly scale check (lab balances) 9/12/05
E&E Display trend summary (1996-2000)
Total daily phosphorus in influent (Feb 05 - Sept 05)
Class A biosolids pathogen data; Class B biosolids pathogen data
Class A biosolids metals data; Class B biosolids metals data
SCADA System
- Digester temperature data
- Digester pH data
- Primary clarifier sludge depth
- Incoming wastewater pH

Process Database
- Digester solids retention time
- Digester volatile acid solids data
- Filter press moisture content
- Filter press total solids concentration

14. Nonconformances: Preventive and Corrective Action

Corrective Action Plan (dated 4/12/04) for KDHE audit

15. Biosolids Program Periodic Performance Report

2004 / 2005 Performance Report & Management Review

16. Internal EMS Audits

Internal EMS audit report (J Klamm May 24 05)
Internal audit checklist & results (May 24, 2005)

Biosolids EMS Status Review 2/10/05
Policy commitment review (9/19/05)

17. Periodic Management Review of Performance

Email J Klamm to Mgmt Committee 6/13/05 (prepare mgmt review & agenda)
Management review meeting notes – J Klamm (6/13/05)
2004/2005 Performance report & Management Review
Minutes for Management Review (Sept 22, 2005)

c) Desk Audit Findings (by EMS Element)

The following "observations" were made during the review of the City of Lawrence EMS Documentation (EMS Manual), which was performed September 5, 2005 by the KEMA Lead Auditor.

Element 1 - Documentation of EMS for Biosolids

1. There is no reference to identify the authority or title of the person approving each section of the EMS Manual.

Element 2 - Biosolids Management Policy

None

Element 3 - Critical Control Points

2. It is not clear from the "List of Critical Control Points" as to what specific "operational controls", "monitoring and measurement", "primary responsibility" and "environmental impacts" apply to each critical control point.

Element 4 - Legal and Other Requirements

3. "Other" requirements are noted as being applicable (Procedure 004, Attachment 4a), however it is not clear how these are identified and tracked.

Element 5 - Goals and Objectives for Continual Improvement

4. Several of the programs (action plans?) for achieving biosolids goals do not clearly identify what the objective is and performance indicators do not include a desired specific and measurable result, leading to uncertainty about the measurability of these goals / objectives.

Element 6 - Public Participation in Planning

5. The Public Participation Plan does not describe how input from interested parties is considered in advance when planning the EMS and developing biosolids goals and objectives.

Element 7 - Roles and Responsibilities

6. It is not clear who has been appointed overall responsibility for ensuring that the biosolids management program and EMS are implemented and maintained or how this is done (note: just "maintaining the EMS Manual and ensuring conformity" is not sufficient).

Element 8 - Training

None

Element 9 - Communication

7. There is no reference in the "Communications and Public Outreach" program as to how relevant EMS information is communicated to employees and contractors.

Element 10 - Operational Control of Critical Control Points

8. The written procedure for identifying operational controls calls for environmental impacts to be determined for each operational control. This is the reverse of what is required.

Element 11 - Emergency Preparedness and Response

None

Element 12 - EMS Documentation, Document Control and Recordkeeping

9. The EMS Manual is not identified as a document requiring control.
10. There are no procedures for controlling the security and disposal of records.

Element 13 - Monitoring and Measurement

11. No written procedure exists for monitoring and measuring compliance with legal and other requirements.

Element 14 - Nonconformances: Preventive and Corrective Action

None

Element 15 - Biosolids Program Periodic Performance Report

None

Element 16 - Internal EMS Audits

None

Element 17 - Periodic Management Review of Performance

None

The City of Lawrence addressed each of the observations noted above using their corrective action process and effective correction for each observation was verified during the onsite portion of this audit.

d) 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.