



**National Biosolids Partnership  
Biosolids EMS Interim Audit Report**

**City of Chattanooga Water Resources Division  
Moccasin Bend Wastewater Treatment Plant  
Chattanooga, Tennessee**

Audit Dates: February 28 – March 2, 2011

Audit Conducted By: DEKRA Certification, Inc. (Chalfont, PA)

Audit Team: Mr. Jon Shaver, Certified Biosolids EMS Lead Auditor / Biosolids Auditor

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Report Date: Draft March 3, 2011

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### 1. SUMMARY

DEKRA Certification, Inc. (DEKRA) conducted an independent audit of the environmental management system (EMS) being used by the City of Chattanooga Moccasin Bend Wastewater Treatment Plant (Chattanooga) in managing its biosolids program. The audit was conducted February 28 to March 2, 2011 at the request of the City of Chattanooga and was an interim audit following Verification of the City of Chattanooga biosolids management system in February 2009.

#### Audit Purposes

The purposes of this audit were to:

- Verify that the biosolids management system being used by the City of Chattanooga conforms to expectations and requirements of the National Biosolids Partnership (NBP) *Environmental Management System for Biosolids*, comprised of 17 EMS Elements
- Confirm that the City of Chattanooga biosolids management system is functioning as intended, with practices and procedures being performed as documented.
- Examine outcomes the City of Chattanooga is achieving by using a systematic approach for managing its biosolids program.

#### Summary of Audit Activities

Consistent with NBP requirements for interim audits, DEKRA reviewed the dynamics of the management system being used by the City of Chattanooga in managing its biosolids program and audited parts of that system for conformance with expectations and requirements of the National Biosolids Partnership EMS Elements (audit criteria). The scope of the audit was consistent with the interim audit program and Statement of Work agreed upon by the City of Chattanooga and DEKRA.

#### Audit Conclusions

The audit determined that:

- The City of Chattanooga biosolids management system is generating positive outcomes, particularly in land application of biosolids.
- No major nonconformances and three minor nonconformances were found during this audit with respect to the audit criteria. Corrective action plans are in place to address the nonconformances.
- All nonconformances from prior third party audits have been effectively corrected.
- Opportunities for improving the effectiveness of the management system were noted.

Based on results of this audit, DEKRA continues our Verification that the City of Chattanooga biosolids management system meets the expectations and requirements of the NBP EMS Elements. We recommend continuing certification within NBP's Biosolids Management (EMS) Program.

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### 2. AUDIT DETAILS

#### 2A. Local Agency Details

Agency Name: City of Chattanooga (referred to as Chattanooga in this report)

Facility: Moccasin Bend Wastewater Treatment Plant, Chattanooga, Tennessee

Number of Employees (approximate): 110

Volume of Wastewater Treated (approximate): = average 65 MGD (combined sewers) with capacity to 140 MGD and wet weather treatment of additional 90MGD

Tons of Biosolids Produced (approximate): 78,000 wet tons per year (Class B)

#### Biosolids Use / Disposition Sites Audited

Burns Farm, Bledsoe TN

#### Contractors included in Audit

Synagro, Inc.

#### 2B. Audit Team

The City of Chattanooga requested DEKRA Certification, Inc. to conduct this third party audit. DEKRA is an accredited Third party Audit Company within the NBP Biosolids Management (EMS) Program. Mr. Jon Shaver conducted the audit for DEKRA. Mr. Shaver is certified by NBP as a Biosolids EMS Lead Auditor and Biosolids Auditor. DEKRA and the auditor assigned to this audit have an independent relationship with The City of Chattanooga that meets criteria established by the National Biosolids Partnership for Third Party Audit Companies and Auditors.

#### 2C. Audit Scope and Methodology

The scope of this audit covered parts of the City of Chattanooga biosolids program, with special attention to practices and management activities that directly support biosolids-related operations, processes and activities.

The audit covered the following topics, consistent with NBP requirements for biosolids EMS interim audits and the interim audits program agreed to by DEKRA and the City of Chattanooga.

1. Management System Dynamics / Effectiveness Review
  - Significant changes
  - Biosolids Policy
  - Goals & Objectives process
  - Corrective & Preventive Action process
  - Management Review process
2. Process Audits (covering all applicable requirements of the NBP EMS Elements)
  - Biosolids Stabilization, Conditioning, Handling
  - Biosolids Storage & Transportation
  - Corrective and Preventive Action

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- Critical Control Points & Operational Controls (Identification)
  - EMS Direction & Planning
3. Verification of effective correction of open nonconformances from previous KEMA audits (January 2010)
  4. Examination of outcomes being achieved by the City of Chattanooga's biosolids program in the areas of regulatory compliance, interested party relations, environmental performance and quality practices.
  5. Interested party interviews

The audit was conducted by interviewing key personnel involved in the City of Chattanooga biosolids program, observing practices in place and reviewing pertinent documents and records. Interested parties were interviewed and transaction tests were performed to verify management system effectiveness. It was performed in a manner consistent with the NBP Auditor Guidance (August 2007). Standard audit sampling techniques were used.

### 2D. Definitions of Audit Findings & Required Corrective Action

Major Nonconformance – a serious omission from requirements and/or other departure that represents, or could cause, a systemic failure, or the existence of multiple related minor nonconformances, or failure to effectively correct a nonconformance in a timely manner. For verification to proceed, correction of major nonconformances must be verified by a third party audit within 90 days.

Minor Nonconformance – an isolated departure from requirements that does not represent a systemic failure. Minor nonconformances require timely and effective correction by the agency and verification by a Third Party Auditor during the next third party audit.

Opportunity (for improvement) – possible improvement in the EMS based on auditor observations. There is no obligation for action in response to these observations.

### 2E. Reference Materials

The following documents were used as references during this audit:

- City of Chattanooga Biosolids Management System Manual
- National Biosolids Partnership "EMS Elements" standard (May 2002)
- National Biosolids Partnership Biosolids EMS Third Party Auditor Guidance (August 2007)
- National Biosolids Partnership Code of Good Practice
- National Biosolids Partnership Manual of Good Practice

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### 3. SUMMARY OF AUDIT RESULTS

#### 3A. Verification Conclusion

Based on the results of this audit, DEKRA has verified that the City of Chattanooga biosolids management system continues to meet the expectations and requirements of the National Biosolids Partnership Biosolids EMS Program. DEKRA's verification of that management system will continue and continuing certification within the NBP Biosolids Management Program is recommended.

#### 3B. EMS Strengths

During this audit DEKRA noted the following strengths in the City of Chattanooga biosolids management system.

- An effective “KPI” approach is being used to monitor performance of the biosolids program.
- The systems-thinking approach is being used by more and more management and operations personnel.

#### 3C. Nonconformances

Three minor nonconformances with respect to requirements of the NBP EMS Elements were found during this audit. The City of Chattanooga has prepared corrective action plans to address each nonconformance and DEKRA's Lead Auditor has reviewed those plans and found them acceptable. Effective correction of the nonconformances will be verified during the next Third Party Audit.

The nonconformances found are listed below.

Minor Nonconformance JS / 11-01/11 NBP EMS Element 11 requires the organization to review & evaluate the effectiveness of emergency procedures, including communication systems. The emergency drill conducted January 6, 2010 did not include any assessment of written emergency procedures or communication systems, the biosolids emergency plan contains reference to an obsolete contractor and Synagro employees who are regularly onsite have not received training in the plant Emergency Contingency Plan.

Minor Nonconformance JS / 11-02/12 NBP EMS Element 12 requires control of biosolids program documents and ensuring they are properly identified, including effective date and approved by authorized personnel. Some unapproved SOPs are being used in the belt filter press (including handwritten notes) and the Synagro Emergency Contingency Plan is not dated or approved.

Minor Nonconformance JS / I / 11-03/14 NBP EMS Element 14 requires nonconformances to be investigated, including cause analysis and corrective action plans. Investigation of a biosolids spill that occurred 11/3/2010 did not include cause analysis or corrective action.

#### 3D. Plans for Closure of Nonconformances

The City of Chattanooga will submit a Corrective Action Plan for each nonconformance found during this audit for approval by DEKRA's Lead Auditor and will correct the nonconformances in a timely

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manner. DEKRA's Lead Auditor will verify the effective correction of each nonconformance during the next Third Party Audit, which is planned for February 2012.

### 3E. Opportunities for Improvement

The following "opportunities" for improving the City of Chattanooga biosolids program were noted during the audit. Opportunities do not represent nonconformances and the City of Chattanooga has no obligation to take any action in response to them.

- TDEC Guidelines for Land Application and Surface Disposal of Biosolids could be an "other requirement" rather than a "legal requirement".
- Consider expanding table identifying critical control points to note separately significant legal / other requirements, biosolids quality, environmental impacts and public acceptance aspects within each biosolids value chain step.
- Tracking of progress towards achieving objectives could note status of objective rather than status of action plan steps.
- Consider establishing a "Key Performance Indicator" (KPI) for Maintenance.
- Consider establishing key performance indicators for Synagro (and Moccasin Bend plant) for handling biosolids and discussing these as a way of demonstrating continual improvement required by contract.
- Including written identification of chemicals contained in storage tanks on side of tank could present a security risk. Hazards could more easily be identified using NFPA or HMIS labels.
- The "503 Report" used in tracking laboratory analyses of biosolids characteristics against EPA 503 requirements could include a level lower than 503 limits to act as a flag to alert operators.
- Inspections of land application sites could include summary assessment of compliance, interested party relations and environmental impacts.
- Impact of the USDA "GRP" initiative could be considered in planning land application of biosolids.

### 3F. Appeals

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. Jim Cox by e-mail at [jcox@wef.org](mailto:jcox@wef.org).

An appeal process is available to persons concerned about the methods and/or scope of this audit. Further information about this appeal process can be obtained directly from DEKRA (contact Pierre Salle, [pierre.salle@kema.com](mailto:pierre.salle@kema.com) or Jon Shaver [jon.shaver@kema.com](mailto:jon.shaver@kema.com)) or from NBP (contact Jim Cox, [jcox@wef.org](mailto:jcox@wef.org)).

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### **3G. Agreements**

The City of Chattanooga and DEKRA have agreed that the next Interim Audit will occur in February 2012. Chattanooga has the option of substituting an internal audit or using a Third Party Audit Company (e.g. DEKRA) to perform this audit. If an internal audit is substituted as an interim audit, the City of Chattanooga will ask DEKRA to review that audit in order to maintain Verification. Chattanooga will make arrangements for audits directly with DEKRA.

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### 4. MANAGEMENT SYSTEM DYNAMICS

Review of the management system dynamics and outcomes is intended to verify that the biosolids management system is functioning effectively and generating positive outcomes (results) and that changes are being incorporated into the system. The following summarizes DEKRA's review of the dynamics of the City of Chattanooga's biosolids management system.

#### 4A Outcomes

The City of Chattanooga biosolids program is improving through the use of their management system. The following outcomes within the past two years were confirmed.

- Contracted handling of biosolids (in plant storage, transportation & land application) has improved through a new contractor and continuing supervision by Chattanooga.
- Land application of Chattanooga biosolids has ceased in Alabama, resulting in less risk of potential noncompliance.
- Programs have been initiated to reduce energy use, limit greenhouse gas emissions and identify carbon footprint for the Moccasin Bend Plant
- Daily O&M meetings and monthly contractor meetings have improved internal communication about biosolids activities.
- A Reliability Program has begun to ensure the mechanical integrity of biosolids handling and processing equipment.
- Internal audits continue to improve in assessment of Policy, goals and objectives and planned parts of the biosolids program.

#### 4B Significant Changes

One significant change has occurred in the past year affecting the City of Chattanooga biosolids management system. The contractor assigned responsibility for storing biosolids in the Moccasin Bend Plant, transporting biosolids to use sites and land applying biosolids on permitted sites was changed to Synagro Inc. A Service Agreement is in place defining responsibilities, including conformance with the City of Chattanooga's Biosolids Policy and EMS requirements. Assessment during this audit of controls in place demonstrated they meet requirements of the NBP EMS Elements.

#### 4C Management System and Documentation Revisions

Major changes to the EMS Manual, top level documentation and major processes within the biosolids management system were reviewed. There were no structurally significant revisions.

#### 4D Correction of Nonconformances From Previous Third Party Audits

Corrective action taken in response to nonconformances from KEMA's Verification Audit of the City of Chattanooga Biosolids Management System in April 2010 and the status of those nonconformances are summarized below.

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Minor Nonconformance JS 10-01/3 NBP EMS Element 3 requires that records link each critical control point and its potential environmental impacts and operational control(s). Some environmental impacts listed in the critical control points table are not stated in a way that describes the impact (e.g. headworks overflows, lime spill, contamination of biosolids).

Corrective Action - The City of Chattanooga determined that the cause of this nonconformance was lack of understanding. In response the City of Chattanooga modified the description of environmental impacts on their list of critical control points to indicate the potential effect (impact) that requires control. This nonconformance is now closed.

### 4E Biosolids Policy Commitments

The City of Chattanooga Biosolids Management Policy remains as approved in 2007. The Policy includes a commitment to follow the principles of the NBP Code of Good Practice. The following summarizes DEKRA's review of the City of Chattanooga's operational consistency with that commitment:

Compliance – Required regulatory reports are submitted on time. The Tennessee Biosolids Regulator confirmed she is satisfied with the City of Chattanooga's biosolids program.

Product – The City of Chattanooga biosolids continually meet Class B requirements and could under certain circumstances meet Class A requirements.

Environmental Management System – A “biosolids management system” is in place. Annual audits verify it meets requirements of NBP EMS Elements.

Quality Monitoring and Practices – Biosolids quality is monitored through routine testing by an onsite laboratory and State certified laboratories. Good housekeeping practices are ensured through routine inspections by Supervisors.

Emergency Plans – Emergency plans are in place and tested periodically. A revised Emergency Preparedness and Response Plan is being prepared for Water Resource Division.

Sustainable Management Practices – Procedures are in place for ensuring sustainability.

Preventive Maintenance - Practices for preventive maintenance are in place. A Reliability Management program is being prepared.

Communications – Proactive communications with interested parties occurs through public meetings and an interactive website. Regular internal communication occurs through staff meetings and ongoing supervision.

Continual Improvement – The agency is committed to continually improving environmental, health and safety performance. Examples of outcomes are discussed under “Outcomes”.

### 4F Effectiveness - Biosolids Goals and Objectives Process

19 of 25 action plans for achieving 2010 objectives were either completed or in progress as of 2/17/2011. New objectives are in place for continually improving performance.

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### **4G Effectiveness - Management Involvement (including Management Reviews)**

Management involvement has been demonstrated through actions taken regarding issues raised in management reviews and programs for measurement and improvement. The actions taken are consistent with defined objectives. Performance against established Key Performance Indicators (KPIs) is reviewed at least monthly. Management Reviews are conducted quarterly to discuss overall performance of the biosolids program.

### **4H Effectiveness - Corrective and Preventive Action Process**

The Corrective and Preventive Action process was used to address nonconformances from previous Third Party Audits and biosolids “incidents”. Nonconformances were effectively corrected and closed.

### **4I Use of NBP Certification and DEKRA Verification**

Use of Certificate References and DEKRA’s Verifications were reviewed and changes were discussed. There were no concerns.

### **4J Audit Conclusion – Management System Dynamics & Effectiveness**

Review of the dynamics of the City of Chattanooga Biosolids Management System confirmed that it is generating positive outcomes and functioning effectively, except as noted below:

Minor Nonconformance JS/11-02/12 NBP EMS Element 12 requires control of biosolids program documents and ensuring they are properly identified, including effective date and approved by authorized personnel.

Some unapproved SOPs are being used in the belt filter press (including handwritten notes) and the Synagro Emergency Contingency Plan is not dated or approved.

In addition, the following opportunities were noted during this part of the interim audit:

- Tracking of progress towards achieving objectives could note status of objective rather than status of action plan steps.
- Consider expanding table identifying critical control points to note separately significant legal / other requirements, biosolids quality, environmental impacts and public acceptance aspects within each biosolids value chain step.

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### 5. OBSERVATIONS + RESULTS - PROCESS AUDITS

The following describes the results of DEKRA's audit of processes The City of Chattanooga uses in managing biosolids activities and the level of conformance of each process with applicable requirements of the EMS Elements.

#### 5A Solids Stabilization, Conditioning & Handling

Solids from primary clarifiers are thickened in gravity thickeners. Part of flow is digested (anaerobic) and part is blended with waste activated sludge from the secondary clarifiers. Blended solids are thickened in centrifuges or filter press and sent to onsite storage for subsequent transportation to land application sites. Critical control points are understood, SOPs are in place and Operator skills follow a mentoring system and are assessed annually.

Audit of the process described above found it meets NBP expectations and conforms to applicable requirements of the EMS Elements.

#### 5B Biosolids Use – Land Application - Tennessee

Biosolids are land applied on permitted farms by a contractor (Synagro). The contractor keeps extensive records of solids applied to each field. Chattanooga inspects application sites regularly, reports results and discusses any concerns with the contractor. A site inspected during this audit (Burns Farm) appeared to be properly applied.

##### Audit Result:

Audit of the process described above found it meets NBP expectations and conforms to applicable requirements of the EMS Elements:

In addition, the following opportunities were noted:

- Impact of the USDA “GRP” initiative could be considered in planning land application of biosolids.
- Inspections of land application sites could include summary assessment of compliance, interested party relations and environmental impacts.

#### 5C Compliance (with legal & other requirements)

Biosolids compliance with 503 regulations is monitored daily (onsite laboratory) and no NOVs have occurred in the past year. Compliance at land application sites is monitored through ongoing inspections. Reports to regulatory agencies are complete and submitted on time. The TN Bioslids Coordinator reported no problems with City of Chattanooga compliance.

##### Audit Result:

Audit of the process described above found it meets NBP expectations and conforms to applicable requirements of the EMS Elements:

In addition, the following opportunities were noted:

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- TDEC Guidelines for Land Application and Surface Disposal of Biosolids could be an “other requirement” rather than a “legal requirement”.

### 5D Contractor Control

A Service Agreement (contract) is in place defining responsibilities of contractor (Synagro) and MBWWTP). This Agreement includes responsibilities for conformance with Biosolids Management System requirements. Monthly meetings are conducted to plan and discuss ongoing matters.

#### Audit Result:

Audit of the process described above found it meets NBP expectations and conforms to applicable requirements of the EMS Elements:

In addition, the following opportunities were noted:

- Consider establishing key performance indicators for Synagro (and Moccasin Bend plant) for handling biosolids and discussing these as a way of demonstrating continual improvement required by contract.

### 5E Emergency Preparedness

A Biosolids Program Emergency Preparedness and Response Plan is in place for the Moccasin Bend Plant. In addition, an Emergency Plan for the entire plant is being prepared. A table-top emergency exercise was conducted with local Fire Department personnel in attendance 1/6/2010. Synagro has an Emergency Contingency Plan in place for their biosolids responsibilities and emergency procedures and contact information is available on trucks. Incidents, such as biosolids spills, are investigated and corrective actions are taken to prevent recurrence.

#### Audit Result:

Audit of the process described above found it meets NBP expectations and conforms to applicable requirements of the EMS Elements, except as noted below:

Minor Nonconformance JS / 11-01/11 NBP EMS Element 11 requires the organization to review & evaluate the effectiveness of emergency procedures, including communication systems.

The emergency drill conducted January 6, 2010 did not include any assessment of written emergency procedures or communication systems, the biosolids emergency plan contains reference to an obsolete contractor and Synagro employees, who are regularly onsite, have not received training in the plant Emergency Contingency Plan.

Minor Nonconformance JS / 11-03/14 NBP EMS Element 14 requires nonconformances to be investigated, including cause analysis and corrective action plans.

Investigation of a biosolids spill that occurred 11/3/2010 did not include cause analysis or corrective action.

In addition, the following opportunities were noted:

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- Including written identification of chemicals contained in storage tanks on side of tank could present a security risk. Hazards could more easily be identified using NFPA or HMIS labels.

### **5F Laboratory**

An onsite laboratory is used to test solids at various processing stages to ensure compliance with regulations. Checks are done regularly using an offsite NELAP certified lab. Records of all tests are kept in a database. Lab personnel are qualified with an Associates Degree in Chemistry as a minimum.

#### Audit Result:

Audit of the process described above found it meets NBP expectations and conforms to applicable requirements of the EMS Elements:

In addition, the following opportunities were noted:

- The “503 Report” used in tracking laboratory analyses of biosolids characteristics against EPA 503 requirements could include a level lower than 503 limits to act as a flag to alert operators.

### **5G Maintenance**

Maintenance considers their role as “keeping the plant running efficiently”. Performance monitoring includes completed work orders, use of assets and equipment / parts availability. . A preventive maintenance system is in place and a new computerized maintenance management system (City Works) is being developed. Daily meetings are held with operations & maintenance personnel to plan and discuss ongoing issues.

#### Audit Result:

Audit of the process described above found it meets NBP expectations and conforms to applicable requirements of the EMS Elements:

In addition, the following opportunities were noted:

- Consider establishing a “Key Performance Indicator” (KPI) for Maintenance.

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### APPENDICES

#### List of Participants

The following persons participated in this audit. Other persons provided additional explanations, as necessary.

#### City of Chattanooga Personnel

Alice Cannella	Plant Superintendent
Mark Hromi	Maintenance Supervisor
Brian Lessman	Plant Operations Supervisor – Solids
Paul Patterson	Mgr Lab Services
Carol Poll	Admin Support Specialist
Joyce Snyder	Administrative Assistant
Gary Williams	Occupational Safety Specialist
Ed Wellman	Project Engineer
Gary Young	Mechanic

#### Other

Shorty Beatty	Soil Conservationist Hamilton County
Aaron Lloyd	Technical Services Manager – Synagro
Doris Magouirk	Moccasin Bend Plant Site Supervisor – Synagro
Chad Raines	Field Supervisor – Synagro
Donald Seagall	Water Environmental Consultant
Angela Young	Environmental Specialist -TDEC

#### List of Documents & Records Reviewed

2010 Biosolids Performance Report	KPI tracking report 2010
Agenda – Biosolids Handling Meeting 10/12/10	Maintenance work orders (various)
Analysis of biosolids samples (various)	Master SOP list – Laboratory 6/4/08
Appendices to BMS Manual	Newsletter 9/09
Biosolids Management Policy statement (10/7/08)	Notice & Necessary Information – Farm code BL001
Biosolids Management Reviews (2/17/11, 10/14/2010, 7/15/2010)	2/24/11
Biosolids Program Emergency Preparedness & response Plan 12/15/09	Pre-operating checklist BL022, BL023
BMS CAPA (various)	Report of 503 Analysis (various)
BMS goals & objectives 2/17/11	Resolution 25096 (adopted 4/27/09)
BMS Manual 1/26/09	RFP January 2010
Corrective Action Plans (various)	Sample chain of custody WS37423
e-coli samples worksheet	Site inspections (various)
Emergency Preparedness & Response Plan (biosolids) 12/15/09	Solids Operation SOPs (various)
Emergency Response Plan for MBWWTP October 2010	Spill control plan SOP 4/10/10
Incident investigation 54-2271 11/3/2010	Sustainability Survey 9/29/10
Internal audit report March 15-23, 2010	Synagro Contingency Plan
Internal audit report August 2010	TDEC Guidelines for Land Application of Biosolids
	Tracking report BL002
	Training records (various)

**END OF REPORT**