NATIONAL BIOSOLIDS PARTNERSHIP AUDIT REPORT

City of Richmond,
Department of Public Utilities
Wastewater Treatment Plant
Richmond, Virginia

Audit conducted by

NSF-International Strategic Registrations

William R. Hancuff, Lead Auditor

References:
National Biosolids Partnership (NBP) ***EMS Elements***
NBP ***Third Party Verification Auditor Guidance – November 2001***
(Latest Revision March 2006)
NBP ***Code of Good Practice***
City of Richmond, Virginia
Environmental Management Program
Biosolids Manual
Issued and Approved by Deputy Director
(Revised – 2010)

Final Report – December 27, 2010

INTRODUCTION

The purpose of the Biosolids Environmental Management System (EMS) Third Party Verification audit is to evaluate the City of Richmond, Virginia's Biosolids Management Program and determine its EMS' conformance with the EMS standard of the National Biosolids Partnership (NBP). The goal of the Third Party Verification audit is to collect and evaluate objective evidence that determines whether the City of Richmond's biosolids EMS is functioning as intended, that practices and procedures are conducted as documented, and that the EMS as implemented conforms to the NBP's EMS Elements, the Code of Good Practice and the EMS program objectives.

RECOMMENDATION

Based on the results of the City of Richmond verification audit it is the recommendation of the audit team that the City of Richmond Wastewater Biosolids EMS receive "Verification" status. Verification is not the end, but rather the beginning of a continuously improving biosolids management system.

AUDIT SCOPE

In general terms, the scope of the Third Party Verification audit encompasses the entire biosolids value chain (pretreatment, collection and treatment, through final end use) with special attention on those practices and management activities that directly support biosolids-related operations, processes, and activities within the Wastewater Treatment Plant's operations.

The NSF-International Strategic Registrations, Ltd. (NSF-ISR) conducted a third party verification audit of the City of Richmond's Wastewater Biosolids Environmental Management System. The verification began with a document review desk audit and operational readiness review (ORR) completed in early November with the results presented to the City on 11 November 2010. The process continued with an on-site verification audit from 13 December through 17 December 2010. The on-site audit team consisted of Dr. William R. Hancuff, Lead Auditor.

The physical biosolids facilities included in the audit and visited during the operational readiness review and verification audit included the Richmond Wastewater Treatment Plant, specifically the following critical control points of the biosolids value chain: hauled waste discharge point, bar screens, grit removal system, primary settling tanks, primary solids grit removal cyclones, primary solids gravity thickening tanks, activated sludge aeration tanks, secondary clarifiers, waste-activated sludge centrifuges, anaerobic digesters, two biosolids storage tanks, final dewatering centrifuges, truck biosolids loading facilities, and concrete pad biosolids storage area. Additionally the following land application sites were observed: James River Correctional Facility land application site 46B in Powhatan County and the David E. Hawkes land application sites NWDEH 9-12 in Nottoway County.

The following individuals were interviewed as part of the audit process:

Robert Steidel, Deputy, Director II
Barbara D. Jackson, Utility Plant Supervisor
Clair Watson, Utility Plant Superintendent II
Eric Whitehurst, Utility Plant Superintendent I/Acting Environmental Manager
Noureddine E. Elamghari, Utility Plant Operator and EMS representative
Wanda Brown, Administrative Program Support Assistant
Kimberlee Stubbs, Senior Chemist
Barrymore Beckley, Maintenance Trades Supervisor
Glenn M. Lewis, Maintenance Superintendent
Troilyn McKenzie, Environmental Technician II - Pretreatment
Caroline Hemenway, President Hemenway Environmental Services (Observer)
Ed Edmonson, Utility Plant Supervisor
Willie Whitaker, Utilities Plant Supervisor (Chief Operator)
Thomas Harris, Safety Officer
Percy Wyatt, Trades Superintendent – CSO/collection
Emilee Carpenter, State of Virginia, Department of Environmental Quality, VPDES Water Permit Writer
Anita Tuttle, State of Virginia, Department of Environmental Quality, Biosolids Specialist
Mark Mongold, State of Virginia, Department of Environmental Quality, Biosolids Inspector
Pete Machno, National Biosolids Partnership (Observer)
Neil Wagner, Greeley and Hanson Environmental Engineers
Robert Sheffield, Operator II
Donald Carter, Project Management Analyst, Maintenance
Angela Fountain, Public Information Manager
Mariane Jorgenson, Marketing and Public Relations in Communications
Daryl Weaver, Chute operator with Nutri-blend
Bruce Richardson, truck driver with Nutri-blend
Mary Powell, Operations Manager with Nutri-blend
Robert Crockett, Consultant with Advantus; Virginia Biosolids Council
David Simons, Vice President of Operations with Nutri-blend
Dwane Simons, Field Foreman and Equipment Operator with Nutri-blend
Juan Evans, Truck Driver with Nutri-blend
Jason Sullivan, Equipment Operator with Nutri-blend
Susan Trumbo, Recyc Systems, Inc., Vice President Technical Manager
Harrison Moody, Recyc Systems, Inc. Regional Manager
Mitch Priest, Recyc Systems, Inc. Field Manager and Maintenance Mechanic
David E. Hawkes, Farmer and land application site owner in Nottoway County

DOCUMENTATION REVIEW

Document review was conducted during the two phases of the audit process, in the desk audit/operational readiness review and in the verification audit. During each of these activities various documents were reviewed to verify conformance with the National

Biosolids Partnership (NBP) *EMS Elements* using the NBP *Third Party Verification Auditor Guidance*. Additionally interviews were conducted with various personnel to obtain supplemental objective evidence on the effectiveness of the implementation of the EMS. Attachment 1 summarizes the documents and other objective evidence associated with each element that was considered during the above mentioned reviews.

DESK AUDIT/OPERATIONAL READINESS REVIEW

A complete document review was performed as a desk audit. The principal focus was on the City of Richmond Wastewater Biosolids EMS Manual. The operational readiness review (ORR) involved assessment of supplemental information such as cross referenced standard operating procedures, management review records, background reference information, training records, summary of outcomes, and various public outreach and communication materials. It also entailed evaluation of a biosolids land application site.

The results of the desk audit/ORR provided a number of observations and opportunities for improvement. This initial effort resulted in 7 observations and 12 opportunities for improvement and four positive commendations. Detailed results from desk audit/ORR are provided in Attachment 2.

Most of the observations identified during the desk audit/ORR were found to have been corrected at the time of the verification audit. In addition, almost all of the opportunities for improvement identified during the initial audit/review were also addressed.

VERIFICATION AUDIT FINDINGS

The verification audit covered all elements of the standard in considerably greater detail than the desk audit/ORR. The former was performed by one auditor over a period of five days and the results demonstrated an improvement in the system. The verification audit found 4 minor non-conformances, 11 opportunities for improvement and 5 commendations or positive observations. For an environmental management system, which is more challenging than the ISO 14001 standard, this is an impressive accomplishment.

The following is a review of the positive observations made during the verification audit. Minor non-conformances and opportunities for improvement follow and are listed by item number in the sequence of the NBP standard elements.

Positive Observations

The City of Richmond Wastewater Treatment Plant Biosolids Value Chain personnel involved in the biosolids environmental management system development should be recognized for their outstanding achievements, and the exceptional features of their Biosolids EMS. The following are those observations made during the audit that deserve commendations.

- The Facility has developed an excellent use of internet links to various web sites which present sources of information related to federal and state regulations

- The city participates in a benchmark program for training their internal EMS auditors. It is the highest level of EMS training observed in the NBP program.

- The city personnel have prepared excellent and detailed set of Standard Operating Procedures (SOPs) for operations of biosolids critical control points.

- The land application contractor, Recyc, has prepared exemplary "Site Books" for each of the land application sites over which they have control. These books go above and beyond the basic legal requirements for biosolids land application.

- The audit checklist developed for the internal audit is a model which could be used by all organizations interested in the biosolids EMS program.

Minor Non-conformances

Requirements 4.2 and 1.6 – Table 4.1 presents general broad regulations and permits. The information given does not clearly include or cross-reference what specific standards, limits, etc. the facility must meet in order to be in compliance; or the operational controls, procedures, processes, and other management methods used to achieve and maintain compliance. Presently in the table there are no specific detailed legal reference to those applicable sections of 40 CFR 503 regulations, the State of Virginia Land Application Regulations, the land application section of the City of Richmond VPDES Permit and the specific regulations that apply to the contractors land application permit/operations.

Requirement 8.4 – The loading and hauling subcontractor has not received the required biosolids critical control point training and EMS awareness training.

Requirement 12.2 – The EMS procedure 12 does not precisely describe the exact method that is used for properly marking the EMS manual and Standard Operating Procedure documents with version numbers, effective dates, and references to replaced or superseded versions (revision histories), etc.

Requirement 15.1 – The periodic biosolids program and EMS performance reports prepared for 2008 and 2009 did not contain summaries of the performance of the biosolids program relative to the goals and objectives and the progress made in each of the required four outcome areas. Also a specific detailed summary of how the city performed in meeting each of the regulatory requirements associated with Class B biosolids production and land application were not included.

Opportunities for Improvement

Requirement 1 – Consider performing a global search and replace throughout the EMS manual for the term “sludge” and substitute the terms “solids” or “biosolids” where appropriate.

Requirement 3 – In the column of Table 3.1 that addresses “responsible staff” consider including the City of Richmond position responsible for overseeing the land application contractor for those critical control points assigned to the contractor.

Requirement 3.2 – The last column in Table 3.1 entitled “potential environmental impacts” is excellent in identifying operational impacts associated with critical control points, however not all of the actual or potential environmental impacts are specifically identified associated with each critical control point.

Requirement 5.1 – For Goal 1.6 of the 2011 list of goals and objectives clarify the details of improved response time for maintenance work requests, which are composed of two parts – the time from the initiation of the work request to the time for issuance of the work order, and second the time from the issuance of the work order to the time for completion of the work order.

Requirement 5.2 – Consider establishing as a biosolids EMS goal for 2011 the public information personnel’s idea of having a television presentation of the City of Richmond’s biosolids program on Richmond’s PBS program entitled Virginia Currents and/or having TV reporter Mark Holmberg present a story on the same subject.

Requirement 7.4 – Clarify in the roles and responsibilities section of the Element 7 procedure that the land application contractor has a subcontractor that is responsible for loading and hauling biosolids to land application sites and is an integral part of the biosolids EMS value chain.

Requirement 7.4 – Consider including a link to the land application contractor’s proposal for satisfying the requirements of the request for proposal which have become part of the service agreement for that contract.

Requirement 8.1 – Consider centralizing and consolidating all of the training records for ease in tracking by training activity and individual. These training activities would include but not be limited to certification training, process cross-training, contractor training, EMS awareness training, etc.

Requirement 12.3 – EMS procedure 12 does not identify the method used to establish and maintain records of biosolids management activities relative to the retention period. This shortfall is for EMS documents as well as federal and state regulatory records.

Requirement 14.6 – EMS procedure 14 does not presently reference the use of the P-drive and “main saver” for tracking progress in completing EMS audit corrective actions.

Requirement 16 – Consider referencing or linking the internal audit checklist and the internal audit report form as templates to be used for all future internal audits. (Note: the biosolids EMS outcomes are not fully addressed in sufficient detail in the internal audit procedure.)

In order to address the above minor non-conformances, the City of Richmond Wastewater Biosolids personnel will prepare corrective action work request forms and will implement corrective actions according to their EMS procedures to provide continual improvements to their biosolids program.

There have been notable improvements in the Facility's EMS over the past month as observed by the lead auditor during the verification audit. This level of improvement will undoubtedly continue into the future.

And finally, the hard work and dedication of the EMS Team must be acknowledged. While attainment of the EMS verification goal is obviously a team effort the guidance provided by the Biosolids Supervisor and EMS Coordinator to ensure accomplishment of this goal must be recognized.

CITY OF RICHMOND COMMENTS

The verification audit findings describe the current EMS biosolids program, including the positive observation and the minor non-conformances. The program is continually improving to achieve and surpass the city of Richmond biosolids commitment to the environment, the 4 minor non-conformances and the opportunities for improvement of audit have been addressed with CARs and the implementation of the corrective actions are almost complete.

OUTCOMES MATTER

The City of Richmond Public Utilities Biosolids Environmental Management System established three broad EMS goals for 2009, 2010 and 2011. In 2009 the goals contained 8 objectives within those goals, in 2010 there were 11 goals, and in 2011 there are, at this time, proposed to be 13 goals. The goals and objectives were developed by the Biosolids EMS coordinator and the Biosolids Team considering public interest. The wastewater treatment plant biosolids goals for its EMS was established cognizant of each of the four outcome focal points of the NBP program as identified below:

- Environmental Performance,
- Regulatory Compliance,
- Relations with Interested Parties, and
- Quality Biosolids Management Practices.

While it is not a requirement to fully attain all objectives established, it is a critical component of the system to make progress towards accomplishing the overall goal. The early goals and objectives did not fully utilize the Specific, Measurable, Achievable, Relevant, and Time Bound (SMART) criteria; however the system has since incorporated this approach in development of objectives.

The three goals of the City of Richmond's biosolids program are:

1. Meet or surpass applicable regulatory compliance requirements associated with biosolids product.

2. Optimize dewatering centrifuge operations/storage capacity and minimize costs.

3. Improve public understanding of biosolids land application in areas where Richmond DPU's biosolids are applied.

In 2009 there were three objectives identified under goal 1, namely: have zero notices of permit violation from DEQ related to management of biosolids; establish better staff training in biosolids operations; and evaluate and update biosolids operations maintenance procedures. In 2010 there were also three similar objectives under goal 1: to not receive notices of permit violations from DEQ related to management of biosolids; to have 100% of staff complete general EMS awareness training; and to have 100% of the maintenance personnel trained on SOPs.

In 2009 there were two objectives identified under goal 2, namely: optimize dewatering centrifuge operation to maintain a monthly average of 20% to 24% solids; and to review polymer dosing and identify methods to minimize its use. In 2010 there were five goals identified within the second objective, specifically: optimize dewatering centrifuge operation to maintain a monthly average of 24% solids (later increased to 25%); to review polymer dosing and identify methods to minimize its use; to lower polymer expenses; to improve the centrate quality from the centrifuges; and to maintain daily digester temperatures above 95 degrees F.

In 2009 there were three objectives identified under goal 3, namely: to have the land application contractor conduct public outreach activities in areas where Richmond's biosolids are applied; to mail information letters to County biosolids monitors; and to continue tours of the wastewater treatment plant. In 2010 the first two objectives established in 2009 for this goal were repeated.

It should be noted that many of these goals and objectives fulfill the needs of different outcome areas. Their attainment or accomplishment satisfies multiple outcomes where there are overlaps. The facility's performance relative to each of the four outcome areas is summarized below.

In the <u>Environmental Performance</u> outcome area, the City of Richmond had no notices of permit violation from DEQ related to biosolids management. This was an

accomplishment of the first objective in goal # 1 for 2009 and 2010. This also satisfied the regulatory compliance outcome area.

The 2009 and 2010 goal of EMS staff training EMS had a positive impact on environmental performance through making all operations and maintenance staff fully aware of the biosolids value chain and the importance of increasing the performance reliability of each of the critical control points. This was fully completed.

Similarly, the objectives in 2009 and 2010 associated with training of all operation and maintenance personnel on updated Standard Operating Procedures and maintenance procedures improves the overall performance of the biosolids processing though the entire value chain. Because of the importance of the centrifuge and control panel operations at this facility the initial training was focused on these areas. Detailed training of operators and maintenance personnel was conducted to ensure full and complete understanding of these critical areas.

The initial objective of optimizing the dewatering centrifuge to produce and maintain 20% to 24% solids was established in 2009. Once this was accomplished with a degree of certainty and reliability the stretch goal of maintaining a monthly average of 24% solids was established for 2010. This environmental performance goal has been accomplished, and it is interesting to note that another stretch goal has been established for 2011 to consistently attain 25% solids.

Along with producing the maximum concentration of solids from the centrifuge comes the responsibility to optimize polymer utilization. The objective in 2009 was to investigate alternative operational controls and identify methods of fine tuning polymer dosages to minimize polymer waste. This objective was continued into 2010 with the additional objective of specifically reducing the polymer expenses. Significant progress has been made in identifying options for controlling dosage and the objective is being carried over as a 2011 objective with the specific goal of reducing polymer costs by 3% without losing product quality.

Two additional environmental performance objectives established for 2010 were to improve the centrate quality produced by the dewatering centrifuges to maintain less than 500 mg/l at all times. And to ensure that the digesters maintain a minimum of 95 degrees F at all times. The former target of 500 mg/l was maintained throughout the performance period except for three excursions. Additionally, the digesters temperature was maintained for the entire time except for a total of two days. Both of these accomplishments represent greater than 99% attainment.

In the Regulatory Compliance outcome area, the City of Richmond established the goal of meeting or surpassing regulatory compliance requirements associated with biosolids production. A couple of the objectives dedicated to this outcome were discussed above, namely maintaining a perfect compliance record by having no notices of violation associated with biosolids production or land application. This was an objective that was established for both 2009 and 2010 and attained.

Another objective that can be related to regulatory compliance is training of personnel not only on the EMS but also on the standard operating procedures. The EMS identifies all of the regulatory requirements needed for proper treatment and land application of biosolids and the SOPs themselves contain specific regulatory requirements that must be followed to assure compliance. The accomplishment of these training programs improves the probability of continuing to maintain the record of no notices of violation.

In the Relations with Interested Parties outcome area, the City of Richmond established the goal of improving public understanding of biosolids land application in areas where Richmond Department of Public Utilities biosolids are applied. In both 2009 and 2010 the City established the objectives of having the land application contractor develop a program to conduct public outreach activities. The contractor prepared a list of these activities. Some of these activities included: 1) participation in biosolids technology forum held in Richmond conducted by the Virginia Biosolids Council and including participation by farmers, wastewater treatment plant professionals and state and federal government regulators; 2) sponsorship of an EPA, DEQ and Virginia Tech land application demonstration; 3) outreach and education to Goochland County farmers regarding biosolids land application program and DEQ permitting process; 4) outreach and education provided to Goochland County Board of Supervisors and county administrators; 5) participation in the annual meeting of the Virginia Association of Counties and 6) outreach to farmers in Campbell County, Fauquier County and Lunenburg County. Additional outreach programs were planned for Charles City County, Powhatan County, King William County, Cumberland County and Amelia County.

In the Quality Biosolids Management Practices outcomes area, all of the goals and objectives and accomplishments discussed in the environmental performance outcome section equally apply to this outcome area.

CONCLUSIONS AND RECOMMENDATIONS

The results of the verification audit are positive. The review and approval of the corrective action plans for each of the minor non-conformances identified during the verification audit has been completed. The full implementation of the corrective actions for the minor findings will be accomplished according to the schedule proposed in the corrective action requests (CARs) and it is the recommendation of the audit team that the City of Richmond Wastewater Biosolids EMS receive “Verification” status.

As was mentioned previously, an EMS is a continuous improvement process, and verification is not the end -- it is the beginning. The results of this and future audits will provide value added to the system and should be viewed as an overall opportunity to improve. Every audit is a snapshot in time, and does not, or cannot, identify each and every area for improvement. And yet, while no single audit identifies all of the areas for improvement the results of each audit provide an additional incremental step in the overall system’s improvement.

Based on discussions between the Facility's Biosolids EMS Coordinator and the third party auditor the following tentative interim audit schedule is proposed for the next four years:

Year 1 (third party) – Elements 1, 2, 4, 5, 6, 7, 9, 10, 14, 15 and 17

Year 2 (internal or third party) – Elements 1, 2, 5, 6, 8, 9, 10, 14, 15 and 17

Year 3 (third party) – Elements 1, 2, 3, 5, 10, 13, 14, 15, and 17

Year 4 (internal or third party) – Elements1, 2, 5, 10, 11, 12, 14, 15, 16 and 17.

Attachment 1

Documents and Other Objective Evidence Reviewed During the Desk Audit/Operational Readiness Review And Verification Audit

Element 1. Documentation of EMS for Biosolids

- City of Richmond Wastewater Treatment Facility Environmental Management Program Biosolids Manual Issued and Approved by Deputy Director II – 2010.
- EMS Element 1 – EMS Documentation, Rev 8, 11/30/2010.
- Table 1.1 – EMS Organization by Categories.
- EMS Element 2 – Biosolids Management Policy, Rev 8, 10/26/2010.
- Interview with Robert Steidel, Deputy, Director II
- Biosolids Management Policy Statement signed by Robert Steidel on Feb 8, 2007.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst, and Noureddine E. Elamghari.
- EMS Element 3: Critical Control Points – Table 3.1- Critical Control Points (CCP) Operations.
- EMS Element 6 – Public Participation in Planning, Rev 8, 11/01/2010.
- EMS Element 9 – Communication, Rev 8, 11/01/2010.
- EMS Element 11 – Emergency Preparedness and Response, Rev 8, 11/03/2010.
- EMS Element 7 – Roles and Responsibilities, Rev 8, 11/01/2010; Key Biosolids EMS Roles and Responsibilities – Hauling/Land Application Contractor.
- Request for Proposal (RFP) # H10158-1 – Management and Beneficial Use of Digested Biosolids by Land Application – April 29, 2010.
- Land Application Contract Modification, January 29, 2010.
- Recyc Systems, Inc response to (RFP) # H10158-1 – May 26, 2010.

Element 2. Biosolids Management Policy

- EMS Element 2 – Biosolids Management Policy (including Code of Good Practice), Rev 8, 10/26/2010.
- Interview with Robert Steidel, Deputy, Director II
- Interviews with Barbara D. Jackson and Clair Watson.
- Request for Proposal (RFP) # H10158-1 – Management and Beneficial Use of Digested Biosolids by Land Application – April 29, 2010.
- Recyc Systems, Inc response to (RFP) # H10158-1 – May 26, 2010.
- EMS Element 9 – Communication, Rev 8, 11/01/2010.
- Communication of Policy to Recyc Systems, Inc by email on 11/15/2010.
- Verified employees and contractors received awareness training through interviews.
- Checked employees' biosolids policy on personal laminated cards.
- Policy displayed throughout wastewater treatment plant on posters.
- Policy communicated to interested parties through availability on web-site.

Element 3. Critical Control Points

- EMS Element 3 – Critical Control Points, Rev 8, 10/26/2010.
- EMS Element 3: Critical Control Points – Table 3.1- Critical Control Points (CCP) Operations (including relationship to value chain, operational control references and environmental impacts) for 2009.
- Review of Critical Control Points performed on October 26, 2010.
- EMS Element 3: Critical Control Points – Table 3.1- Critical Control Points (CCP) Operations (including relationship to value chain, operational control references and environmental impacts) for 2010.
- WWTP Flow and Solids Handling Diagram – June 2002.
- WWTP Site Plan.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst, Noureddine E. Elamghari, Barrymore Beckley, Ed Edmonson, Willie Whitaker, Don Carter, Daryl Weaver (contractor), Bruce Richardson (contractor), Dwane Simons (contractor), Susan Trumbo (contractor), Harrison Moody (contractor),and Mitch Priest (contractor).
- Comparison of Critical Control Points with those contained in Appendix F of the National Manual of Good Practice.
- Nutri-Blend (land application contractor) EMS Manual "Critical Steps" book.
- Field review of biosolids value chain critical control points.
- Reviewed Hawkes farm land application site in Nottoway County.
- Reviewed the James River Correctional Center land application site 46 B in Powhatan County.
- Spot checked operational SOPs with critical control points.
- Reviewed "Thickening, Digestion and Dewatering Asset Evaluation Report" prepared by Greeley and Hansen, October 2010.

Element 4. Legal and Other Requirements

- EMS Element 4 – Legal and Other Requirements, Rev 8, 11/01/2010.
- Table 4.1 List of Relevant Legal and Other Requirements.
- Recyc Systems, Inc. land application site books with plans.
- NPDES Permit for 2005, Permit # VA0063177, Part I Section G. Sewage Sludge Use and Disposal p. 15 & 16.
- NPDES Draft Permit for 2010, Part I Section A (3), F and G (biosolids requirements).
- Reviewed VA Title 12, Chapter 585
- Standard Operating Procedure: Pretreatment Chain-of-Custody, 3/23/2007.
- Review of Pretreatment Program with Eric Whitehurst (Compliance Officer).
- Verified links in legal procedure to federal and state regulations.
- Interviews with plant personnel – Barbara D. Jackson, Clair Watson, Noureddine E. Elamghari, Troilyn McKenzie (pretreatment), Willie Whitaker, Don Carter, David Simons (contractor), Susan Trumbo (contractor).

- Interviews with State regulators - Emilee Carpenter, DEQ, VPDES permit writer, Anita Tuttle, DEQ, biosolids specialist, Mark Mongold, DEQ, biosolids inspector.
- Reviewed EMS Procedure: Control Building Digester # 1 – 5 SOP, June 2008 for inclusion of legal requirements.
- Reviewed EMS Procedure: Control Building Digester # 1 – 5 SOP, Nov 2010 for inclusion of legal requirements.

Element 5. Goals and Objectives for Continual Improvement

- EMS Element 5 – Goals and Objectives for Continual Improvement, Rev 8, 10/26/2010.
- EMS Table 5.1 – Biosolids EMS Goals and Objectives for 2009.
- EMS Table 5.1 – Biosolids EMS Goals and Objectives for 2010.
- EMS Table 5.1 – Biosolids EMS Goals and Objectives for 2011 (draft).
- Biosolids Goal Action Plan form for tracking outcomes and objectives and targets.
- Checked quarterly progress reviews on goals and objectives.
- Reviewed Record of Biosolids Goal Action Plan covering 2007 though 2010.
- Evaluated 2010 for SMART criteria.
- EMS Management Review agenda for June 9, 2009.
- Reviewed quarterly schedule of management review of performance.
- Minutes of management review meeting held November 14, 2009.
- Interviews with Robert Steidel, Clair Watson, Eric Whitehurst, and Barbara Jackson.
- Interviews with Biosolids Team: Wanda Brown, Noureddine Ezzine Elamghari, Troilyn McKenzie, Barrymore Beckley, Edwin Edmondson, Kimberlee Stubbs, Percy Wyatt, and Susan Trumbo.

Element 6. Public Participation in Planning

- EMS Element 6 – Public Participation in Planning, Rev 8, 11/01/2010.
- Wastewater Tour Survey form.
- Wastewater Tours Log-sheets – 2006 - 2010.
- Invitation to attend third party verification audit – September 10, 2010.
- Reviewed Nutri-Blend (land application contractor) Communications Strategy.
- Checked Nutri-Blend's Public Outreach activities for 2007 through 2010.
- Reviewed the City's Biosolids EMS website information.
- Reviewed Virginia Biosolids Council's public outreach program used by Nutri-Blend.
- Virginia Department of Health pamphlets.
- Virginia Cooperative Extension biosolids information.
- Virginia Department of Environmental Quality – Frequently Asked Questions on Biosolids.
- Reviewed 2010 – 2011 Public Outreach Proposed Activities for Biosolids EMS.
- Checked bi-weekly e-newsletter of the City of Richmond Department of Public Utilities relative to Biosolids EMS program and Richmond's progress on two EMS programs.

- Recyc System proposal dated May 26, 2010 containing on page 48 Public Relations and Community Involvement approach.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst, Noureddine E. Elamghari, and Wanda Brown.
- Interviews with Angela Fountain, Public Information Manager and Mariane Jorgenson, Marketing and Public Relations in Communications.
- Interviews with State regulators - Emilee Carpenter, DEQ, VPDES permit writer, Anita Tuttle, DEQ, biosolids specialist, Mark Mongold, DEQ, biosolids inspector.
- Interview with Robert Crockett, Virginia Biosolids Council.
- Interviews with land application contractors: David Simons, Vice President of Operations with Nutri-blend and Susan Trumbo, Recyc Systems, Inc., Vice President Technical Manager.

Element 7. Roles and Responsibilities

- EMS Element 7 – Roles and Responsibilities, Rev 8, 11/01/2010.
- Table 7.1 – Biosolids EMS Responsibilities.
- Assignment letter for Barbara Jackson's appointment as EMS Biosolids Supervisor dated August 7, 2007.
- Reviewed the City's service agreement with Nutri-Blend (land application contractor).
- Nutri-Blend Land Application Contract Modification, January 29, 2010.
- Request for Proposal (RFP) # H10158-1 – Management and Beneficial Use of Digested Biosolids by Land Application – April 29, 2010.
- Recyc Systems, Inc. response to (RFP) # H10158-1 – May 26, 2010.
- Interviews with Robert Steidel, Clair Watson and Eric Whitehurst.
- Interviews with Barbara Jackson, Noureddine E. Elamghari, and Wanda Brown.
- Interviews with land application contractors: Daryl Weaver, Bruce Richardson, Mary Powell, David Simons, Dwane Simons, Juan Evans, Jason Sullivan, Susan Trumbo, Harrison Moody, and Mitch Priest.
- Interviews with various staff - Robert Sheffield, Don Carter, Ed Edmonson, Willie Whitaker, Thomas Harris, Percy Wyatt, and Barrymore Beckley.

Element 8. Training

- EMS Element 8 – Training, Rev 8, 11/01/2010.
- EMS Awareness Training syllabus.
- Wastewater Operator Training Log for 2010.
- Biosolids Training Log for 2007.
- SOP training log for 2010.
- E-mail documentation on critical control point SOP training.
- Safety Meeting – July 23, 2010, including attendance sheet.
- Reviewed general and advanced EMS training efforts.
- Reviewed Virginia Tech's Center for Organizational and Technological Advancement EMS Institute Environmental Management System training.
- Checked employees' biosolids policy on laminated cards.

- Interviews with Barbara Jackson, Noureddine E. Elamghari, and Wanda Brown.
- Reviewed contractor training material.
- Verified Land Applicator Certifications.
- Interviews with land application contractors: Daryl Weaver, Bruce Richardson, Mary Powell, David Simons, Dwane Simons, Juan Evans, Jason Sullivan, Susan Trumbo, Harrison Moody, and Mitch Priest.

Element 9. Communications

- EMS Element 9 – Communications, Rev 8, 11/01/2010.
- Richmond Public Utilities webpage on Biosolids.
- Reviewed Nutri-Blend (land application contractor) Communications Strategy document.
- Reviewed Biosolids EMS web page and links.
- Checked Biosolids Complaints and Response binder.
- Reviewed 2010 – 2011 Public Outreach Proposed Activities for Biosolids EMS.
- Recyc System proposal dated May 26, 2010 containing on page 48 Public Relations and Community Involvement approach.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst, Noureddine E. Elamghari, and Wanda Brown.
- Interviews with Angela Fountain, Public Information Manager and Mariane Jorgenson, Marketing and Public Relations in Communications.
- Interviews with State regulators - Emilee Carpenter, DEQ, VPDES permit writer, Anita Tuttle, DEQ, biosolids specialist, Mark Mongold, DEQ, biosolids inspector.
- Interview with Robert Crockett, Virginia Biosolids Council.
- Interviews with land application contractors: David Simons, Vice President of Operations with Nutri-blend and Susan Trumbo, Recyc Systems, Inc., Vice President Technical Manager.

Element 10. Operational Control of Critical Control Points

- EMS Element 10 – Operational Control of Critical Control Points, Rev 8, 11/03/2010.
- Standard Operating Procedure: Pretreatment Chain-of-Custody, 3/23/2007
- Standard Operating Procedure: Sludge Digestion Storage Tank #6, Feb 2010.
- EMS Procedure: Control Building Digester # 1 – 5 SOP, June 2008.
- EMS Procedure: Control Building Digester # 1 – 5 SOP, Nov 2010.
- Standard Operating Procedure: Dewatering Building, August 11, 2010.
- Standard Operating Procedure: Biosolids Spill Response Plan, 4/08/2007
- Nutri-Blend EMS Manual “Critical Steps” – operational controls.
- Recyc Systems, Inc. Truck Route to Farley Acres Farm Site, Culpepper County, VA and Robert Gibson Farm, King and Queen County, VA.
- Recyc Systems, Inc. Statewide Operations and Maintenance Manual.
- Recyc’s site specific field notebook – “little black book.”
- Recyc’s Operation and Maintenance Manual for Richmond Wastewater Treatment Plant – April 2010.

- Recyc Systems, Inc. land application site books with plans.
- Discussed SOPs for centrifuges and gravity belt thickeners.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst and Noureddine E. Elamghari.
- Interviews with various staff - Robert Sheffield, Don Carter, Ed Edmonson, Willie Whitaker, Thomas Harris, Percy Wyatt, and Barrymore Beckley.
- Interviews with land application contractors: Daryl Weaver, Bruce Richardson, Mary Powell, David Simons, Dwane Simons, Juan Evans, Jason Sullivan, Susan Trumbo, Harrison Moody, and Mitch Priest.

Element 11. Emergency Preparedness and Response

- EMS Element 11 – Emergency Preparedness and Response, Rev 8, 11/03/2010.
- Reviewed Wastewater Treatment Plant Risk Management Plan Program.
- Wastewater Treatment Utility – Risk Management Program/Process Safety Management (RMP/PSM) Program Document — May 21, 1999; revalidated 2007 (compliance audited 2008).
- Nutri-Blend EMS Manual "Critical Steps" – Emergency and Spill Response Plan updated 11/01/2010.
- Standard Operating Procedure: Biosolids Spill Response Plan, 4/08/2007.
- Emergency Response Flow Chart.
- Biosolids Spill Response Training – April 2007.
- Recyc Systems, Inc. – Transportation Handbook – Emergency Section, Nov 2010.
- Recyc Systems, Inc. – O & M Manual – Transportation and Spill Management Section.
- Interviews with Barbara D. Jackson, Noureddine E. Elamghari and Thomas Harris.
- Interviews with land application contractors: David Simons, Vice President of Operations with Nutri-blend and Susan Trumbo, Recyc Systems, Inc., Vice President Technical Manager.

Element 12. EMS Documentation and Document Control

- EMS Element 12 – Documentation, Document Control, and Record Keeping, Rev 8, 11/01/2010.
- EMS Procedure EP-4.4.5-1 Control of Documents, printed 11/11/2010.
- Request for Proposal (RFP) # H10158-1 – Management and Beneficial Use of Digested Biosolids by Land Application – April 29, 2010.
- Recyc Systems, Inc. response to (RFP) # H10158-1 – May 26, 2010 (section on "off-site" defines various report requirements).
- Nutri-Blend's October Biosolids Analytical Data and Field Reports, dated November 11, 2010.
- Interviews with Barbara D. Jackson, Noureddine E. Elamghari, and Wanda Brown.

Element 13. Monitoring and Measurement

- EMS Element 13 – Monitoring and Measurement, Rev 8, 11/01/2010.

- Nutri-Blend (contractor) procedure for land application.
- Reviewed centrate TSS concentration table and graph from centrifuge for October 2010.
- Reviewed metals, vector summary, pathogen summary for digested biosolids from Jan 2008 thorough July 2010.
- September 2010 Biosolids Analytical Data and Field Reports for Nutri-Blend (land application contractor)
- Recyc Systems, Inc. land application site books with plans.
- Recyc's Operation and Maintenance Manual for Richmond Wastewater Treatment Plant – April 2010. Sections on biosolids sampling and testing and soil sampling procedures.
- Checked quarterly progress reviews on goals and objectives.
- Checked land application field monitoring tools: inclinometer, field auger, depth to water stick, geographical positioning system, set-back flags, biosolids loader, biosolids application equipment.
- Viewed functionality of "Main saver" maintenance management software used in monitoring operations and maintenance.
- EMS Procedure: Control Building Digester # 1 – 5 SOP, June 2008.
- EMS Procedure: Control Building Digester # 1 – 5 SOP, Nov 2010.
- Standard Operating Procedure: Dewatering Building, August 11, 2010.
- Nutri-Blend EMS Manual "Critical Steps" – operational controls.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst and Noureddine E. Elamghari.
- Interviews with various staff - Robert Sheffield, Don Carter, Ed Edmonson, Willie Whitaker, Thomas Harris, Percy Wyatt, and Barrymore Beckley.
- Interviews with land application contractors: Daryl Weaver, Bruce Richardson, Mary Powell, David Simons, Dwane Simons, Juan Evans, Jason Sullivan, Susan Trumbo, Harrison Moody, and Mitch Priest.

Element 14. Nonconformances: Preventive and Corrective Action

- EMS Element 14 – Nonconformance: Preventive and Corrective Action, Rev 8, 11/01/2010.
- Reviewed Corrective Action Request (CAR) format.
- Reviewed CARs prepared to address third party desk audit and operational readiness review findings.
- Reviewed completed CARs for third party document review/operational readiness review conducted in Nov 2010.
- Reviewed CARs for internal audit of November 4 and 5, 2009, and operation and maintenance non-conformances for 2009.
- Maintenance corrective actions tracked on P-drive and discussed during weekly critical control meetings on Tuesdays.
- Interviews with Barbara D. Jackson, Noureddine E. Elamghari, Don Carter, and Wanda Brown.

Element 15. Periodic Biosolids Program and EMS Performance Report

- EMS Element 15 – Performance Report, Rev 8, 11/11/2010.
- Reviewed Biosolids Management Program Performance Report (BMPPR) 2008 – A Quality Partnership for the City of Richmond.
- Reviewed Biosolids Management Program Performance Report (BMPPR) 2009 – A Quality Partnership for the City of Richmond.
- Viewed BMPPRs on website.
- Interviews with Barbara D. Jackson, Noureddine E. Elamghari and Wanda Brown.

Element 16. Internal EMS Audit

- EMS Element 16 – Internal EMS Audit, Rev 8 11/01/2010.
- Biosolids EMS Internal Audit Schedule of Activities for November 4 and 5, 2009.
- Reviewed EMS Biosolids – Internal Audit Checklist.
- Wastewater Plant Biosolids EMS Internal Audit Report for audit performed on November 4 and 5, 2009.
- 2009 Biosolids EMS Internal Audit Summary.
- Reviewed Virginia Tech's Center for Organizational and Technological Advancement EMS Institute training.
- Interviews with Barbara D. Jackson, Noureddine E. Elamghari, Don Carter, and Wanda Brown.

Element 17. Periodic Management Review of Performance

- EMS Element 17 – Periodic Management Review of Performance, Rev 8, 11/01/2010.
- EMS Management Review agenda for June 9, 2009.
- Reviewed quarterly schedule of management review of performance.
- Minutes of management review meeting held November 14, 2009.
- Interview with Robert Steidel, Deputy, Director II
- Interviews with Clair Watson, Eric Whitehurst, Barbara D. Jackson, and Noureddine E. Elamghari.

Attachment 2

Detailed Findings Resulting From Desk Audit/Operational Readiness Review

Observations

Requirement 1.7 – the EMS manual does not adequately describe those biosolids management activities assigned to and performed by the contractor.

Requirement 1.7 – EMS manual procedures do not specifically address all of the EMS element's minimum conformance requirements for contractors, namely items 2.2, 7.4, 8.4, 9.4, 10.4, 11.4, and 16.1. While most of these requirements have been included in the service agreement the specific approaches on how each requirement is satisfied are not contained in the respective element procedures.

Requirement 4.2 – The list of applicable regulatory requirements identified in Element 4 procedure has not been fully developed, and the detailed specific regulatory citations (references) have not been presented. The descriptions do not present what specifically is required. Examples of missing regulatory requirements include: VPDES pretreatment program specifics, VPDES permit requirements (biosolids related), DEQ land application operations permit details, storage facility requirements, complete land application monitoring and measurements requirements, such as; application rates, setbacks, etc.

Requirement 5 – The ultimate responsibility for implementing the contractor's Goals and Objectives has not been fully incorporated into the Department's program.

Requirement 5.3 – There is no objective evidence to demonstrate that input from interested parties was developed through proactive public participation and then used in the development of program goals and objectives.

Requirement 5.5 – Not all of the goals and objectives meet the SMART criteria.

Requirement 7.1 – The Key EMS Roles and Responsibilities (R&R) in EMS Element 7 procedure does not include the R&Rs for the Public Information Manager and the biosolids contractor. Additionally, the R&R for the Deputy Director does not specify involvement in management review. Also review the R&R column in Table 7.1 to ensure it is accurate.

Opportunities for Improvement

Requirement 3.2 – The actual or potential environmental impacts at each critical control point could be more fully or accurately developed and presented in Table 3.1

Requirement 5.6 – Consider removing those goals and objectives that have been accomplished from Table 5.1 – Biosolids EMS Goals and Objectives.

Requirement 5.6 – Consider removing goals and objectives that do not represent continuous improvement, for example, having zero notices of violation from DEQ related to biosolids when there has not been an NOV in several years.

Requirement 5.6 – Consider establishing new annual goals and objectives by January 1 of each year.

Requirement 5.6 – Consider including goals and objectives already established in the wastewater EMS, associated with installing new centrifuges, as goals and objectives of the biosolids EMS. Also evaluate when it would be appropriate to include various upgrades of the biosolids value chain resulting from recommendations contained in the Biosolids Master Plan.

Requirement 6.1 – Consider additional or new approaches to implementing a proactive public participation program that will result in obtaining information from interested parties that can be used in the biosolids management program and EMS planning process, especially the development of goals and objectives.

Requirement 7.1 – Review the details of each procedure to ensure that the section of that procedure which addresses "Responsible Staff" is consistent with the responsibilities presented in the procedure.

Requirement 7.4 – Consider having the biosolids contractor be a member of the Biosolids EMS Team

Requirement 10.2 – Ensure that all legal/other requirements are incorporated into operational controls (SOPs) of critical control points.

Requirement 12.4 – Consider having the biosolids contractor review its document control procedures for improvements using the City of Richmond system's document control procedures.

Requirement 14 – Review the EMS Corrective Action Form to determine if it can more accurately reflect the requirements of the biosolids program.

Requirement 15.2 – Verify the method of availability of the Biosolids Management Program Performance Report on the City's website.

Positive Commendations

Requirement 4.1 – Excellent use of internet links to various web sites which present sources of information related to federal and state regulations

Requirement 10 – Excellent support from Nutri-blend (biosolids contractor), which clearly represents the interests of the Richmond Biosolids EMS extremely well.

Requirement 16 – Benchmark program implemented for training EMS auditors. The highest level of EMS training in the NBP program seen to date by the auditor.

Requirement 16.3 – The audit checklist developed for the internal audit is outstanding.

Attachment 3

National Biosolids Partnership Appeals Process

Biosolids organizations that participate in the National Biosolids Partnership (NBP) Environmental Management System (EMS) Program are required to undergo an EMS verification audit by an independent, third party auditor assigned by the NBP and yearly interim audits. The purpose of the EMS audit is to determine whether or not the organization's EMS conforms with -- that is, meets the requirements of -- the NBP program, as defined in the EMS Elements[1]. The spirit of these requirements includes a well-documented program and meaningful opportunities for interested party involvement.

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 audit company's official verification decision or interim audit decision.

To submit an appeal before the Appeals Board, the petitioner must set forth the specific EMS element(s) and requirements that is believed to have not been evaluated and/or implemented consistent with NBP requirements as reflected in the EMS Elements, along with the objective evidence to support that claim. For example, a petitioner may believe that a major nonconformance exists but was not found by the auditor. In this case, the petitioner would need to identify in the petition the specific EMS element believed to be out of conformance and why.

To submit an appeal, petitioners must fill out and submit the standardized appeals petition form that is available on the NBP website at http://www.biosolids.org. A formal appeal must be submitted within 30 days of the verification decision or interim audit decision by the audit company.

The Board's Administrative Officer receives all appeals petitions on behalf of the Board and conducts a basic completeness check. Upon completion of this check, the petition is either forwarded to Appeals Board members or back to the petitioner with incomplete areas documented Petitions should be sent via certified, return receipt requested mail to:

> The NBP EMS Appeals Board, Attention: Board Administrative Officer, c/o Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314

[1] The *EMS Elements* and other program materials are available on the NBP website at http://www.biosolids.org.

The Appeals Board will examine the facts, interview parties involved, deliberate the case, and then make a determination as to whether a major nonconformance does or does not exist. Appeals cases vary in complexity. As a result, the time required for the Board to evaluate a case and make a decision might vary. However, the overall Board target for processing an appeal is approximately four months.