

**NATIONAL BIOSOLIDS PARTNERSHIP  
FIRST INTERIM 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) BMP Elements  
NBP Third Party Verification Auditor Guidance – November 2001  
(Latest Revision August 2011)  
NBP Code of Good Practice  
City of Richmond, Virginia  
Wastewater Treatment Plant  
Biosolids Management Program Manual  
*Issued and Approved by Deputy Director  
(Revised – 2011)***

**Final Report – December 9, 2011**

## **INTRODUCTION**

The purpose of the Biosolids Management Program (BMP) interim audits is to verify through regular reviews the program's health and effectiveness between verification audits. The third party on-site interim audits provide independent reviews and supports credibility between re-verification audits. The goal of the third party interim audit is to collect and evaluate objective evidence related to a portion of the BMP such that over the course of the four interim audits conducted between verification audits all 17 elements are covered. The audits determine whether the City of Richmond Wastewater Treatment Plant BMP is functioning as intended, that practices and procedures are conducted as documented, and that the BMP as implemented conforms to the NBP's Code of Good Practice and BMP program objectives.

## **RECOMMENDATION**

The results of the City of Richmond interim audit and review of their biosolids management program are positive, and it is the recommendation of the audit team that the Wastewater Treatment Plant BMP maintain its "Certification" status.

## **AUDIT SCOPE**

The NSF-International Strategic Registrations, Ltd. (NSF-ISR) conducted a third party interim audit of the City of Richmond Wastewater Treatment Plant BMP from November 30, 2011 through December 2, 2011. The on-site interim audit team consisted of Dr. William R. Hancuff, Lead Auditor.

The scope of the interim audit specifically included a review of the requirements of Elements 5, 14, and 17; namely the organization's progress toward goals and objectives; BMP outcomes (environmental performance, regulatory compliance, interested party relations, and quality practices); actions taken to correct minor non-conformances; the management review process; and corrective and preventive action requests and responses. Because other system elements interact with the above specific requirements the interim audit also included partial auditing of activities found in elements 1, 2, 4, 6, 9, 15, and 16.

Since the NBP allows that any individual interim audit cover a portion of the BMP, but requires that over the course of the four interim audits conducted between verification audits the entire BMP (i.e. all 17 elements) must be covered, the following elements were audited in their entirety as part of this first interim audit; elements 3, 10, 12 and 13. Auditing these elements involved document review, interviews, and activity evaluations.

The physical biosolids facilities included in the audit and visited during the first interim audit included the following critical control points of the biosolids value chain: hauled waste discharge point, bar screens, primary settling tanks, primary solids grit removal cyclones, primary solids gravity thickening tanks, activated sludge aeration tanks, methanol feed system, 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. Because of wet weather there were no land application activities operating and review was limited to land application site plans and other documents.

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

Willie Horton, Deputy Director II  
Barbara D. Jackson, Utility Plant Supervisor  
Clair Watson, Utility Plant Superintendent II  
Eric Whitehurst, Utility Plant Superintendent I/Acting Environmental Compliance Officer  
Noureddine E. Elamghari, Utility Plant Operator and BMP representative  
Donald Carter, Project Management Analyst, Maintenance  
Wanda Brown, Administrative Program Support Assistant  
Kimberlee Stubbs, Senior Chemist  
Troilyn McKenzie, Environmental Technician II - Pretreatment  
Avis Purrington, Chief Chemist, Quality Assurance, Pretreatment Water Quality Lab  
Crolyn McKenzie, Environmental Tech II, Permit writer and inspector  
Percy Wyatt, Trades Superintendent – CSO/collection  
John Adamtec, Instrumentation and Control Technician  
Glenn M. Lewis, Maintenance Superintendent  
Thomas Harris, Safety Officer  
Cedric Bogans, Wastewater Operator IV  
Mark Mongold, State of Virginia, Department of Environmental Quality, Water Programs, Biosolids Group, Biosolids Inspector  
Emilee Carpenter, State of Virginia, Department of Environmental Quality, Senior Water Permit Writer  
Susan Trumbo, Recyc Systems, Inc., Vice President Technical Manager  
Harrison Moody, Recyc Systems, Inc. Regional Manager  
Oscar Johnson, Operations Manager for DW Carey Hauling  
Kevin Snead, Driver for DW Carey Hauling

## **INTERIM AUDIT FINDINGS**

The interim audit found 1 positive finding, no major non-conformances, 3 minor non-conformances, and 9 opportunities for improvement.

The following is a review of the positive observation made during the interim audit. Minor non-conformances and opportunities for improvement follow and are listed in

accordance with the numbers associated with the minimum conformance standards contained in the Third Party Verification Auditor Guidance document.

### **Positive Observations**

The City of Richmond Wastewater treatment management and plant operations personnel involved in the BMP maintenance and continual improvement should be recognized for their outstanding achievements, and the exceptional features of their program. The following positive item was observed during this audit.

### **Commendations:**

The biosolids program manager has continually improved the diversity of the BMP team membership. By rotating the membership on the team to include new members more employees become aware of the details of the program and interaction of the elements resulting in an overall improvement in the plant wide implementation of the system.

The continued hard work and dedication of the BMP Team is also acknowledged. While maintaining the BMP verification status is obviously a team effort the guidance provided by the Biosolids Manager to ensure continual improvement of the program is recognized.

### **Minor Nonconformance**

Requirement 1.6 – The BMP manual does not include or cross reference all operational controls, procedures, processes, and other management methods used to achieve and maintain compliance with legal and other requirements. (See tables 3.1 and 4.1)

Requirement 4.2 – The list of applicable regulatory requirements identified in Table 4.1 of BMP Element 4 procedure does not provide the precise regulatory citations (references) that are specifically applicable to the Richmond biosolids operations. Examples of missing regulatory citations are for the specific pathogen and vector attraction reduction alternatives selected by the City to meet Class B biosolids quality.

Requirement 17.1 – The agenda for the management review meeting contains some but not all of the specifically required discussion items as follows: BMP performance relative to policy commitments; BMP performance relative to its goals and objectives, and performance measures; internal audit results and possible need for changes to policy, goals and objectives, biosolids management activities and other BMP elements; external third party audit results recommendations and possible need for changes to policy, goals and objectives, biosolids management activities and other BMP elements; and changing circumstances and commitment to continual improvement and resultant possible need for changes to policy, goals and objectives, biosolids management activities and other BMP elements.

## **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 (consider environmental impacts such as air pollution, surface water pollution, groundwater pollution, land contamination, ecological impacts, human health impacts, plant and/or animal impacts, etc.)

Requirement 3.2 – In the column in Table 3.1 entitled “responsible staff” consider including a City of Richmond person or persons responsible for each and every activity listed, including all subcontractor activities.

Requirement 5.6 – Consider adding new annual goals and objectives for each of the outcome areas.

Requirement 8.1 – Consider providing EMS training to new audit staff and refresher training to auditors who have already received the basic EMS auditor training.

Requirement 8.1 – Consider having the biosolids hauling contractor provide biosolids refresher training to its drivers.

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

Requirement 12.1 – Consider including a reference and link to the Document Control Log in the BMP Element 12 procedure.

Requirement 15.1 – In the preparation of the Biosolids Management Program Report consider expanding the discussion of progress and accomplishments of the goals and objectives in each of the outcome areas: environmental performance, regulatory compliance, relations with interested parties, and quality biosolids management practices. Additionally consider including a section in the report on the overall cost of biosolids management (total operational costs attributable to the biosolids value chain critical control points) and the financial savings attributable to accomplishment of individual goals and objectives.

Requirement 16.1 – There is no description of or link to the specific City of Richmond internal audit checklist form and internal audit report template in the BMP Element 16 procedure.

## **CITY OF RICHMOND COMMENTS**

The first interim audit findings accurately describe the current Biosolids Management Program including the positive observation, minor non-conformances and opportunities for improvement. The program is continually improving to achieve and surpass the city

of Richmond biosolids commitment to the environment, the 3 minor non-conformances and the 9 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 Management System established three broad BMP goals for 2010 and 2011. In 2010 the broad goals contained 11 sub-goals or objectives, and in 2011 there were the same broad goals and 13 objectives. At the time of the audit the goals and objectives were being formulated for 2012. The BMP coordinator and Biosolids Team developed the goals and objectives, considering the interest of the public. The wastewater treatment plant biosolids goals for its BMP 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 meet all objectives established, it is a critical component of the system to make progress towards accomplishing the goals. 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, which have been the same for the past three years, 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 2010 there were six objectives associated with goal 1: 1) to test for PCBs in the centrate, plant influent and plant effluent; 2) to reuse 100% of methane gas produced from anaerobic digesters; 3) to train all biosolids value chain staff on SOPs related to their job functions; 4) to maintain a minimum digester temperature of 95 degrees F on a daily basis; 5) to upgrade dewatering centrifuges, digesters and thickening to produce class A biosolids; and 6) to improve response time for maintenance work request to be approved within 7 days.

In 2011 there were five objectives associated with goal 1, all of which were the same as the previous year's objectives. The objectives were: 1) to reuse 100% of methane gas produced from anaerobic digesters; to train all biosolids value chain staff on SOPs related to their job functions; 2) to maintain a minimum digester temperature of 95 degrees F on a daily basis; 3) to upgrade dewatering centrifuges, digesters and thickening to produce class A biosolids; and 4) to improve response time for maintenance work request to be approved within 7 days.

In 2010 there were three objectives associated with goal 2, namely: 1) to lower polymer expenses by 3%; 2) to improve and maintain centrate quality to less than 500 mg/l TSS; and 3) to optimize dewatering centrifuge operation to maintain monthly average of 25% solids or better. In 2011 there were two objectives associated with this goal, which were the same as identified in 2010. They were: to lower the polymer expenses by 3% and to improve and maintain centrate quality to less than 500 mg/l TSS.

In 2010 there were four objectives associated with goal 3, namely: 1) to conduct one Soil and Water Conservation Bureau (SWCB) field trip to WWTP and field site in 2011 by the hauling/land application contractor; 2) to conduct four public outreach activities in 2011 in areas where Richmond Biosolids are used; 3) to schedule tours of the WWTP for 20 visitors per month; and 4) to update biosolids web page on City website to make it easier to navigate and include information for public input and outreach.

In 2011 there were four objectives associated with this goal, all of which were the same or similar to the 2010 objectives. They were: 1) to conduct one Soil and Water Conservation Bureau (SWCB) field trip to WWTP and field site in 2011 by the hauling/land application contractor; 2) to conduct four public outreach activities in 2011 in areas where Richmond Biosolids are used; 3) to schedule tours of the WWTP for 100 visitors per year; and 4) to update biosolids web page on City website to make it easier to navigate and include information for public input and outreach.

It should be noted that many of these goals and objectives fulfill the needs of various 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 Environmental Performance outcome area, the City of Richmond established a long-term objective in 2010 and 2011 to reuse 100% of methane gas produced from anaerobic digesters. Initial sampling of gas production was completed in 2010 and a gas meter was installed in 2011 to provide more precise quantitative data. Additionally, an engineering study was included in a contract entitled "Contract Number 5" to further evaluate the options and feasibility of using digester gas for plant boilers and cogeneration.

The 2010 and 2011 objectives of training all biosolids value chain staff on SOPs related to their job functions 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. 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. Additional training was subsequently provided such that this objective was fully completed. It will now be transferred to become a routine part of the standard BMP training procedure.

Another environmental performance objective established for 2010 and 2011 was to maintain a minimum digester temperature of 95 degrees F on a daily basis. The quantity of digester gas has been observed to increase with increase in digester temperature. Gas production continues to increase with increasing temperature up to a maximum, and then decreases as the temperature continues to rise beyond the optimum. Maintaining a daily temperature above 95 degrees will improve gas production as well as assure that the regulatory required monthly average temperature of 95 degrees is always maintained. This objective has been met over 98% of the days in both 2010 and 2011.

The long-term objective of upgrading dewatering centrifuges, digesters and thickening to produce class A biosolids established for 2010 and 2011 has a direct environmental performance outcome. The implementation of this objective requires many years, therefore it is planned to be carried out over several phases. The first phase was an initial assessment report prepared in October 2010. Additional phases are planned but not yet funded and the objective is tentatively scheduled for completion by 2013 or after.

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 and 2011 with a refinement of the objective to reduce the polymer expenses by 3%. Significant progress was made in identifying options for controlling dosage, and the further study was conducted throughout 2011. The positive outcome from this objective was the improved operating knowledge of the centrifuge. It was also determined that further cost reductions associated with polymer expenses would cause unacceptable losses in product quality. The expense objective was not accomplished, but the improved operational controls were.

An objective for 2010 and 2011 was to improve the centrate quality produced by the dewatering centrifuges to maintain less than 500 mg/l of TSS at all times. Substantial improvements in the centrate quality were accomplished through 2010. And up through August of 2011 the objective of less than 500 mg/l of TSS was attained. Since that time there were two days on which the TSS concentration was not met. On a daily basis this represents over 98% success.

An 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 was accomplished, and it was improved further by establishing another stretch goal in 2011 – to consistently attain 25% solids. The new goal was attained for a period of several months and then a change in personnel resulted in backsliding on this objective. The target can be met but only with the commitment of dedicated well-trained personnel.

In the Regulatory Compliance outcome area, the City of Richmond completed testing for PCBs in the centrifuge centrate, plant influent and plant effluent in 2010. This was in response to the DEQs concern over concentrations of this chemical in wastewater and their preliminary investigation on whether it may need to be regulated. This objective also satisfied the outcome area related to relations with interested parties and addressing the concerns of interested parties, since the driver behind the testing was public concern over the existence of PCBs in the James River. The City completed this evaluation and submitted a report to the Virginia DEQ.

Another 2010 and 2011 objective that can be related to regulatory compliance is that of training all biosolids value chain staff on SOPs related to their job functions. The BMP 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 City's record of no notices of violation. Detailed training of all biosolids value chain staff on SOPs was conducted to ensure full and complete understanding of these critical areas. Additional training was subsequently provided such that this objective was fully completed. This training activity will now be transferred to become a routine part of the standard BMP training procedure.

Another objective that serves to meet the regulatory requirement outcome established for 2010 and 2011 was to maintain a minimum digester temperature of 95 degrees F on a daily basis. This objective was discussed in the environmental performance outcome area as it relates to improved digester gas production, but it also ensures compliance. Maintaining a daily temperature above 95 degrees will not only improve gas production but also ensure that the regulatory required monthly average temperature of 95 degrees is always maintained. This objective has been met over 98% of the days in both 2010 and 2011.

The long-term objective of upgrading dewatering centrifuges, digesters and thickening to produce class A biosolids discussed in the environmental performance outcome area serves equally well in the regulatory compliance area because producing Class A biosolids reduces the legal requirements for land application. The implementation of this objective will require many years. The initial assessment phase was completed in October 2010. Additional phases are planned and the objective is tentatively scheduled for completion by 2013 or after.

In the Relations with Interested Parties outcome area, as was mentioned previously in the regulatory outcome area, the City of Richmond completed testing for PCBs in its centrifuge centrate, plant influent and plant effluent in 2010. This was in response to public concern over the existence of PCBs in the James River and the potential need to regulate this contaminant in the future. The City completed this evaluation and submitted a report to the Virginia DEQ.

The hauling/land application contractor established an objective in both 2010 and 2011 to conduct one Soil and Water Conservation Bureau (SWCB) field trip to a wastewater treatment plant (WWTP) and field site. There was no record of a field trip to a WWTP or field site in 2010; however, on April 14, 2011 the contractor and SWCB participated in a tour of the Henrico County WWTP (without a record of a trip to a field site).

For both 2010 and 2011 an objective was established to conduct four public outreach activities each year in areas where Richmond Biosolids are used. This was a carryover objective from 2009. The City assigned this objective to the land application contractor, who developed a program to conduct public outreach activities. The contractor prepared a list of these activities, including: 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. For 2011 the contractor participated in the following: Virginia Tech production meeting with Virginia Tech Extension (3 meetings), Virginia Farm Show, Virginia Forage conference DEQ permit meetings (6), Virginia Ag Expo by the Virginia grain association, and Central Virginia Beef day.

Another objective in the public outreach area was to schedule tours of the WWTP for 20 persons per month in 2010 and for 100 visitors per year in 2011. Due to security issues carrying over from 9/11 only 46% of the tour objective was attained in 2010 and only about 50% was attained by December 2011.

The final objective in the relations with interested parties outcome area established for both 2010 and 2011 was to update biosolids web page on City website to make it easier to navigate and include information for public input and outreach. Updates began with addition of the periodic Biosolids Management Program Performance Report and prominent display of the BMP Policy. The site was evaluated and found to be improved and generally user friendly.

In the Quality Biosolids Management Practices outcomes area, the 2010 and 2011 objectives of training all biosolids value chain staff on SOPs related to their job functions ensures quality biosolids management practices by 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. Training has been fully completed and this activity will now be transferred to become a routine part of the standard BMP training procedure.

The objective 2010 and 2011 related to maintaining a minimum digester temperature of 95 degrees F on a daily basis satisfies the quality biosolids management practices outcome as well as the previously discussed environmental performance and regulatory requirement outcome areas. The quantity of digester gas has been observed to increase with increase in digester temperature. Therefore maintaining a daily temperature above 95 degrees will improve gas production. This objective has been met over 98% of the days in both 2010 and 2011.

The long-term objective of upgrading dewatering centrifuges, digesters and thickening to produce class A biosolids discussed in the environmental performance and regulatory compliance outcome areas also fits in the quality biosolids management practices outcome area. Producing Class A biosolids is clearly a quality management practice. The full implementation of this objective will require many years and is tentatively scheduled for completion by 2013 or after.

The 2010 and 2011 objective of improving response time for maintenance work requests to be approved within 7 days is a quality management practice that will ensure more efficient processing of required preventive maintenance activities. Over the past two years the time to approve a maintenance work request has been reduced to an average of 3.3 days – surpassing the established objective.

As was discussed in the environmental performance outcome section an objective was established to maximize the concentration of solids from the centrifuge and minimize polymer use. The initial effort investigated alternative operational controls and identify methods of fine-tuning polymer dosages to minimize polymer waste. The follow-up effort was focused on cost reductions. There was an improvement in optimizing the centrifuge operations but substantial cost saving beyond the initial optimization were not attained.

Another objective for 2010 and 2011 which can be used to meet the quality management practices outcome area as well as the environmental performance outcome is the improvement in centrate quality to maintain less than 500 mg/l of TSS at all times. Substantial improvements have been made through 2010 and 2011 such that at present the TSS concentration is met over 98% of the time on a daily basis.

The final objective, which counts for both quality management practices and environmental performance, is optimization of the dewatering centrifuge from 2009 through 2011. This has progressed from maintain 20% solids to 25% solids. This improvement represents a cost savings in biosolids transportation for land application of over 20%.

## CONCLUSIONS AND RECOMMENDATIONS

The results of the first interim 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 BMP retain its “Verification” status.

As was mentioned previously, the BMP is a continuous improvement process, and 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 Plant’s BMP Coordinator and the third party auditor, the schedule of individual elements to be audited in their entirety such that the all elements of the BMP are covered before the re-verification audit are as follows:

Year 1 (third party) – Elements 3, 10, 12, 13

Year 2 (third party) – Elements 1, 8, 15, 17

Year 3 (third party) – Elements 5, 6, 9, 14, 16

Year 4 (third party) – Elements 2, 4, 7, 11

Year 5 (third party) Re-verification

## **Attachment 1**

### **Documents and Other Objective Evidence Reviewed During the First Interim Audit**

#### Element 1. Documentation of Biosolids Management Program

- City of Richmond Wastewater Treatment Facility Biosolids Management Program Manual Issued and Approved by Deputy Director II – 2011.
- BMP Element 1 – Documentation, Rev 9, 9/26/2011.
- Table 1.1 – BMP Organization By Categories.
- BMP Element 2 – Biosolids Management Policy, Rev 9, 10/05/2011.
- Interview with Willie Horton, Deputy Director II
- Biosolids Management Policy Statement signed by Willie Horton.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst, and Nouredine E. Elamghari.
- BMP Element 3: Critical Control Points – Table 3.1- Critical Control Points (CCP) Operations.
- BMP Element 6 – Public Participation in Planning, Rev 9, 11/01/2010.
- BMP Element 9 – Communication, Rev 9, 9/26/2011.
- BMP Element 11 – Emergency Preparedness and Response, Rev 9, 9/26/2011.
- BMP Element 7 – Roles and Responsibilities, Rev 9, 9/26/2011; Key Biosolids BMP Roles and Responsibilities – Hauling/Land Application Contractor.
- Request for Proposal (RFP) # H10158-1 – Management and Beneficial Use of Digated Biosolids by Land Application – April 29, 2010.
- Recyc Systems, Inc. response to (RFP) # H10158-1 – May 26, 2010.

#### Element 2. Biosolids Management Policy

- BMP Element 2 – Biosolids Management Policy (including Code of Good Practice), Rev 9, 10/05/2011.
- Interview with Willie Horton, Deputy Director II
- Interviews with Barbara D. Jackson and Clair Watson.
- Request for Proposal (RFP) # H10158-1 – Management and Beneficial Use of Digated Biosolids by Land Application – April 29, 2010.
- Recyc Systems, Inc. response to (RFP) # H10158-1 – May 26, 2010.
- BMP Element 9 – Communication, Rev 9, 9/26/2011.
- Policy displayed throughout wastewater treatment plant on posters.
- Policy communicated to interested parties through availability on web site.

#### Element 3. Critical Control Points

- BMP Element 3 – Critical Control Points, Rev 9, 9/26/2011.

- BMP 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 2011.
- Field observation of Critical Control Points.
- WWTP Flow and Solids Handling Diagram – June 2007 illustrating chemical feed points.
- WWTP Site Plan.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst, Nouredine E. Elamghari, Ed Edmonson, Don Carter, Harrison Moody (land application contractor), and Oscar Johnson (hauling contractor).
- 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

- BMP Element 4 – Legal and Other Requirements, Rev 9, 9/26/2011.
- Table 4.1 List of Relevant Legal and Other Requirements.
- VPDES Permit No. VA0063177, expiration March 30, 2010 (administratively continued).
- Microbac Laboratories, Inc. Richmond Division, Certificate of Analysis: 2/28/11, 3/21/11, 5/20/11, and 10/12/11.
- Microbac Laboratories – VA Laboratory Certification valid through Jun 14, 2012.
- Recyc Systems, Inc. Operation and Maintenance Manual, containing Biosolids regulations and permits.
- Land Application Site Notebook for Donald L. Holder Site, LUDLH 1-5. Lunenburg County.
- Land Application Site Notebook for Steve M. Parrish Site, CRSMP 1-10, Caroline County.
- Management and Beneficial Use of Digested Biosolids by Land Application, RFP # 10158-1, City of Richmond, May 26, 2010.
- Review of Pretreatment Program with Eric Whitehurst (Compliance Officer), Troilyn McKenzie, and Avis Purrington.
- Public Notice of Industry in Significant Non-compliance with Richmond Pretreatment Regulations, 4 Feb 2010.
- Pretreatment Program 2010 Annual Report submitted to VA DEQ January 29, 2011.
- Interviews with plant personnel – Barbara D. Jackson, Clair Watson, Nouredine E. Elamghari, and Don Carter.
- Interviews with contractors – Harrison Moody, Recyc Systems, Inc. Regional Manager (land application) and Oscar Johnson, Operations Manager for DW Carey Hauling (biosolids hauler).
- Harrison Moody’s DEQ Certificate of Competence as a Certified Land Applicator and Certified Nutrient Management Planner, expiration 2/28/2012.
- Interviews with State regulators - Mark Mongold, State of Virginia, Department of Environmental Quality, Water Programs, Biosolids Group, Biosolids Inspector

and Emilee Carpenter, State of Virginia, Department of Environmental Quality, Senior Water Permit Writer.

#### Element 5. Goals and Objectives for Continual Improvement

- BMP Element 5 – Goals and Objectives for Continual Improvement, Rev 9, 9/26/2011.
- EMS Table 5.1 – Biosolids EMS Goals and Objectives for 2010.
- EMS Table 5.1 – Biosolids EMS Goals and Objectives for 2011.
- 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 2010 and 2011.
- Evaluated 2011 G&O for SMART criteria.
- Interviews with Willie Horton, Clair Watson, Eric Whitehurst, and Barbara Jackson.
- Interviews with Biosolids Team: Wanda Brown, Nouredine Ezzine Elamghari, Troilyn McKenzie, Edwin Edmondson, Kimberlee Stubbs, Percy Wyatt, and Avis Purrington.

#### Element 6. Public Participation in Planning

- BMP Element 6 – Public Participation in Planning, Rev 9, 9/26/2011.
- Reviewed 2011 Public Outreach Activities for Biosolids by Recyc, Inc.
- Reviewed the City's Biosolids BMP website information.
- City of Richmond, Department of Public Utilities, Biosolids Management Brochure, 2011.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst, Nouredine E. Elamghari, and Wanda Brown.
- Interviews with State regulators - Mark Mongold, State of Virginia, Department of Environmental Quality, Water Programs, Biosolids Group, Biosolids Inspector and Emilee Carpenter, State of Virginia, Department of Environmental Quality, Senior Water Permit Writer.
- Interviews with contractors – Harrison Moody, Recyc Systems, Inc. Regional Manager (land application) and Oscar Johnson, Operations Manager for DW Carey Hauling (biosolids hauler)

#### Element 7. Roles and Responsibilities

- BMP Element 7 – Roles and Responsibilities, Rev 9, 9/26/2011.
- Table 7.1 – Biosolids BMP Responsibilities.
- Assignment letter for Barbara Jackson's appointment as EMS Biosolids Supervisor dated August 7, 2007.
- 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 Willie Horton, Clair Watson and Eric Whitehurst.

- Interviews with Barbara Jackson, and Nouredine E. Elamghari.
- Interviews with contractors – Harrison Moody, Recyc Systems, Inc. Regional Manager (land application) and Oscar Johnson, Operations Manager for DW Carey Hauling (biosolids hauler).

#### Element 8. Training

- BMP Element 8 – Training, Rev 9, 9/26/2011.
- Harrison Moody’s DEQ Certificate of Competence as a Certified Land Applicator and Certified Nutrient Management Planner, expiration 2/28/2012.
- Interviews with Barbara Jackson, and Nouredine E. Elamghari.
- Interviews with contractors – Harrison Moody, Recyc Systems, Inc. Regional Manager (land application) and Oscar Johnson, Operations Manager for DW Carey Hauling (biosolids hauler).

#### Element 9. Communications

- BMP Element 9 – Communications, Rev 9, 9/26/2011.
- Richmond Public Utilities webpage on Biosolids.
- City of Richmond, Department of Public Utilities, Biosolids Management Brochure, 2011.
- Reviewed 2011 Public Outreach Activities for Biosolids by Recyc, Inc.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst, and Nouredine E. Elamghari.
- Interviews with State regulators - Mark Mongold, State of Virginia, Department of Environmental Quality, Water Programs, Biosolids Group, Biosolids Inspector and Emilee Carpenter, State of Virginia, Department of Environmental Quality, Senior Water Permit Writer.
- Interviews with contractors – Harrison Moody, Recyc Systems, Inc. Regional Manager (land application) and Oscar Johnson, Operations Manager for DW Carey Hauling (biosolids hauler)

#### Element 10. Operational Control of Critical Control Points

- BMP Element 10 – Operational Control of Critical Control Points, Rev 9, 9/26/2011.
- Operations Monitoring Log for Digester
- Thickening Centrifuge Building Log Sheets
- Microbac Laboratories, Inc. Richmond Division, Certificate of Analysis: 2/28/11, 3/21/11, 5/20/11, and 10/12/11.
- Biosolids Transportation Handbook, November 2010.
- Land Application Site Notebook for Donald L. Holder Site, LUDLH 1-5. Lunenburg County.
- Land Application Site Notebook for Steve M. Parrish Site, CRSMP 1-10, Caroline County.

- Management and Beneficial Use of Digested Biosolids by Land Application, RFP # 10158-1, City of Richmond, May 26, 2010.
- Biosolids Hauler – Trip Evaluation Form.
- Standard Operating Procedure: Dewatering Building, June 29, 2011.
- Standard Operating Procedure: Dewatering Building, Historic change log.
- Standard Operating Procedure: The Gravity Thickening Tanks, March 12, 2009.
- Standard Operating Procedure: Cyclone degritters, March 21, 2009.
- EMS Procedure: Centrifuge Thickened Sludge Pump, June 17, 2008.
- Standard Operating Procedure: Thickening Centrifuges, May 20, 2009.
- Standard Operating Procedure: Sludge Digestion Storage Tank #6, Feb 2010.
- EMS Procedure: Control Building Digester # 1 – 5 SOP, Nov 2010.
- Recyc’s Operation and Maintenance Manual for Richmond Wastewater Treatment Plant – April 2010.
- Recyc Systems, Inc. land application site books with plans.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst and Nouredine E. Elamghari.
- Interviews with various staff - Don Carter, Percy Wyatt, John Adamtec, Glenn M. Lewis, Thomas Harris, and Cedric Bogans.
- Interviews with contractors – Harrison Moody, Recyc Systems, Inc. Regional Manager (land application) and Oscar Johnson, Operations Manager for DW Carey Hauling (biosolids hauler)

#### Element 11. Emergency Preparedness and Response

- BMP Element 11 – Emergency Preparedness and Response, Rev 9, 9/26/2011.
- Interviews with Barbara D. Jackson, Nouredine E. Elamghari and Thomas Harris.
- Interviews with contractors – Harrison Moody, Recyc Systems, Inc. Regional Manager (land application) and Oscar Johnson, Operations Manager for DW Carey Hauling (biosolids hauler).

#### Element 12. BMP Documentation and Document Control

- BMP Element 12 – Documentation, Document Control, and Record Keeping, Rev 9, 9/26/2011.
- Operations Monitoring Log for Digester
- Thickening Centrifuge Building Log Sheets
- Microbac Laboratories, Inc. Richmond Division, Certificate of Analysis: 2/28/11, 3/21/11, 5/20/11, and 10/12/11.
- Microbac Laboratories – VA Laboratory Certification valid through Jun 14, 2012.
- Biosolids Transportation Handbook, November 2010.
- Land Application Site Notebook for Donald L. Holder Site, LUDLH 1-5. Lunenburg County.
- Land Application Site Notebook for Steve M. Parrish Site, CRSMP 1-10, Caroline County.
- Management and Beneficial Use of Digested Biosolids by Land Application, RFP # 10158-1, City of Richmond, May 26, 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).
- Interviews with Barbara D. Jackson, Nouredine E. Elamghari, and Wanda Brown.

#### Element 13. Monitoring and Measurement

- BMP Element 13 – Monitoring and Measurement, Rev 9, 9/26/2011.
- Operations Monitoring Log for Digester
- Thickening Centrifuge Building Log Sheets
- Microbac Laboratories, Inc. Richmond Division, Certificate of Analysis: 2/28/11, 3/21/11, 5/20/11, and 10/12/11.
- Microbac Laboratories – VA Laboratory Certification valid through Jun 14, 2012.
- Biosolids Transportation Handbook, November 2010.
- Land Application Site Notebook for Donald L. Holder Site, LUDLH 1-5. Lunenburg County.
- Land Application Site Notebook for Steve M. Parrish Site, CRSMP 1-10, Caroline County.
- Management and Beneficial Use of Digested Biosolids by Land Application, RFP # 10158-1, City of Richmond, May 26, 2010.
- Reviewed centrate TSS concentration table and graph from centrifuge.
- Reviewed metals, vector summary, and pathogen summary for digested biosolids for 2011.
- 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.
- Viewed functionality of “Main saver” maintenance management software used in monitoring operations and maintenance.
- Interviews with Barbara D. Jackson, Clair Watson, Eric Whitehurst and Nouredine E. Elamghari.
- Interviews with various staff - Don Carter, Percy Wyatt, John Adamtec, Glenn M. Lewis, Thomas Harris, and Cedric Bogans.
- Interviews with contractors – Harrison Moody, Recyc Systems, Inc. Regional Manager (land application) and Oscar Johnson, Operations Manager for DW Carey Hauling (biosolids hauler)

#### Element 14. Nonconformances: Preventive and Corrective Action

- BMP Element 14 – Nonconformance: Preventive and Corrective Action, Rev 9, 9/26/2011.
- Reviewed Corrective Action Report (CAR) format.

- Reviewed CARs prepared to address third party verification audit from 2010.
- Reviewed CARs for internal audit prepared mid-November 2011.
- Maintenance corrective actions tracked on P-drive and discussed during weekly critical control meetings on Tuesdays.
- Interviews with Barbara D. Jackson, Nouredine E. Elamghari, and Don Carter.

#### Element 15. Periodic Biosolids Program Report

- BMP Element 15 – Performance Report, Rev 9, 9/26/2011.
- Reviewed Biosolids Management Program Performance Report (BMPPR) 2010.
- Viewed BMPPRs on website.
- Interviews with Barbara D. Jackson, and Nouredine E. Elamghari.

#### Element 16. Internal BMP Audit

- BMP Element 16 – Internal BMP Audit, Rev 9, 9/26/2011.
- Biosolids EMS Internal Audit Schedule of Activities for October 25 and 26, 2011.
- Reviewed EMS Biosolids – Internal Audit Checklist.
- Wastewater Plant BMP Internal Audit Report for audit performed on October 25 and 26, 2011.
- Interviews with Barbara D. Jackson, Nouredine E. Elamghari, and Don Carter.

#### Element 17. Periodic Management Review of Performance

- BMP Element 17 – Periodic Management Review of Performance, Rev 9, 9/26/2011.
- EMS Management Review agenda for June 3, 2011.
- EMS Management Review and Biosolids Team Meeting Minutes for June 3, 2011.
- Management Review Meeting Minutes for June 14, 2011.
- Reviewed quarterly schedule of management review of performance.
- Minutes of management review meeting held November 14, 2009.
- Interview with Willie Horton, Deputy Director II
- Interviews with Clair Watson, Eric Whitehurst, Barbara D. Jackson, and Nouredine E. Elamghari.

## Attachment 2

### National Biosolids Partnership Appeals Process

Biosolids organizations that participate in the National Biosolids Partnership (NBP) Biosolids Management Program (BMP) are required to undergo a BMP verification audit by an independent, third party auditor and yearly interim audits. The purpose of the BMP audit is to determine whether or not the organization's BMP conforms with -- that is, meets the requirements of -- the NBP program, as defined in the BMP Elements<sup>1</sup>. 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 BMP 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 BMP element(s) and requirements that is believed to have not been evaluated and/or implemented consistent with NBP requirements as reflected in the BMP 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 BMP 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 BMP Appeals Board, Attention: Board Administrative Officer, c/o Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314

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.

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<sup>1</sup> The *BMP Elements* and other program materials are available on the NBP website at <http://www.biosolids.org>.