2019 Biosolids Management Program Performance Report

Objective

Biosolids is a term used for several types of treated sewage sludge that can be used as soil conditioner. A **soil conditioner** is a product which is added to soil to improve the soil's physical qualities, usually its fertility (ability to provide nutrition for plants) Soil conditioners can be used to improve poor soils, or to rebuild soils which have been damaged by improper soil management. They can make poor soils more usable, and can be used to maintain soils in peak condition

In the United States Code of Federal Regulations (CFR), Title 40, Part 503 governs the management of Biosolids. Within that federal regulation Biosolids are generally classified differently depending upon the quantity of pollutants they contain and the level of treatment they have been subjected to (the latter of which determines both the level of vector attraction reduction and the level of pathogen reduction). These factors also affect how they may be disseminated (bulk or bagged) and the level of monitoring oversight which, in turn determines where and in what quantity they may be applied

The Biosolid Management Program (BMP) is a designed program specifically tailored to ensure that all facets of the BMP processes be properly conducted. It entails the rigid adherence to process controls, the conveyance of information to all clients (current and prospective) and in-depth training indoctrination. The City Of Richmond; Biosolids Management Policy; adheres to the principles and standards set forth in the National Biosolids Code of Good Practice. The Richmond Wastewater Treatment Plant is wholeheartedly committed to obtaining and wherever possible exceeding all of the objectives as outlined by the policy. The treatment plant's primary focus is to produce Class B Biosolids.

The Biosolids Management Program (BMP) has proven that it's a valuable yet needed mechanism used by the Richmond Wastewater Treatment Plant to monitor and report the successes of the work performed surrounding Biosolids.

A- COMPLIANCE:

To commit to compliance with all applicable federal, state, and local requirements regarding production at the wastewater treatment facility, the Richmond Wastewater Treatment Plant facility has elected to:

1) Meet concentration limits,
2) Meet class "B" pathogen standards;
3) Achieve 38% volatile solids reduction for vector control

As treatment for its anaerobically digested Biosolids, Primary Biosolids is collected from our primary clarifiers, grit removed by hydro-grit units and thickened in four gravity thickeners. Waste activated sludge is pulled from the return Biosolids stream and thickened in four thickening centrifuges. Biosolids is then pumped to one of the five anaerobic digesters. Overflow from the digesters is stored in one of the 2 Biosolids storage tanks and pumped to one of the five dewatering centrifuges where polymer is added. Once dewatered, Biosolids is stored in the plant's storage pads and then hauled to land application site by the hauling/land application contractor.

B- Standards

(1) **Class "B" pathogen standards:** The optimum temperature required for microorganisms to stabilize the organic matter is 95F. During this year, the monthly average temperature and detention time were greater than 95F and 15 days respectively and comply with the federal regulation requirements [40 CFR 503.32(b) (3)].

(2) **Vector Attraction Reduction: [40 CFR 503.33(b) (1)/alt (10)].**

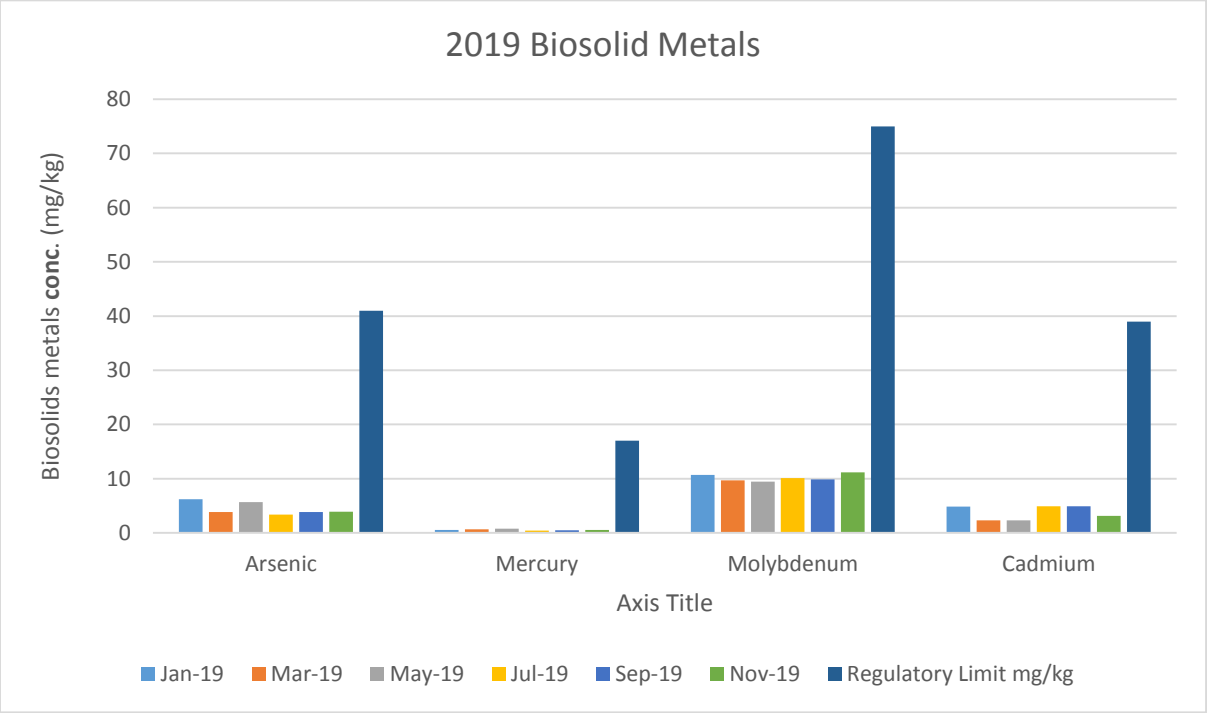
Samples are collected bimonthly; the volatile solids reduction must be equal or greater than 38% to allow the Biosolids to be land applied. Biosolids failing to meet a 38% reduction are incorporated into the ground within six hours or hauled to landfill. All samples were above 38% for this year besides June 2019, where the % VS = 36.6, as a result biosolids were hauled to the landfill.

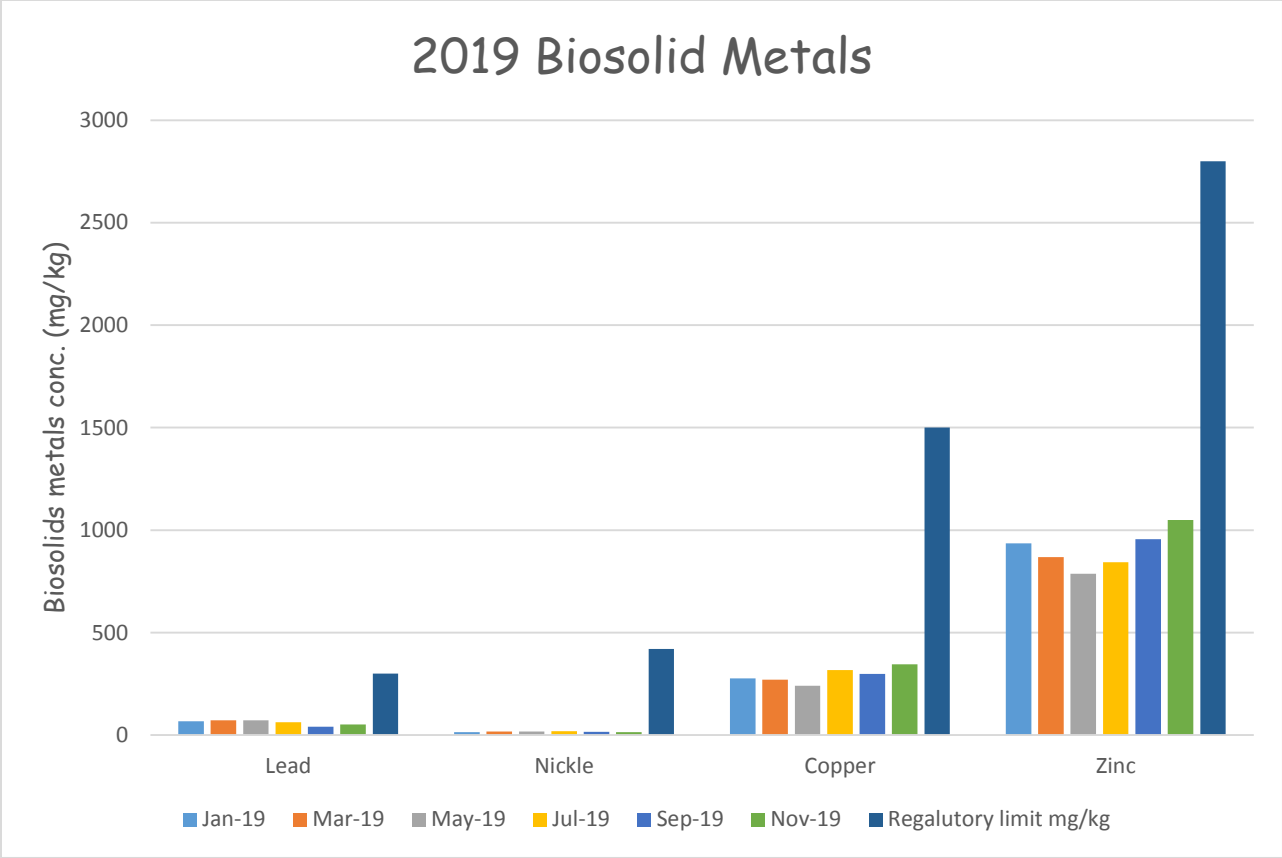
Sample Period	Gravity Thickeners % Volatiles	Thickening Centrifuges % Volatiles	Digester Overflow % Volatiles
JAN-FEB	81.5	70.7	61.1
MAR-APR	79.2	71.1	59.4

MAY-JUN	63.5	63.2	52.4
JUL-AUG	78.9	65.7	58.3
SEPT-OCT	76.3	66.2	59.4
NOV-DEC	82.3	58.5	67.9

(3) **Concentration Limits.**

The chart below shows the Biosolids metals concentration in 2019 and the concentration limits for Arsenic, Mercury, Molybdenum, Cadmium, Lead, Nickel, Copper and Zinc. All metal analytical results are under the required concentration limits.





C PRODUCT & QUALITY MONITORING:

To provide Biosolids that meets the applicable standards for their intended use or disposal, the Richmond Biosolids program is built around the concept of beneficial reuse of nutrients contained within the Biosolids produced from the treatment process. During 2019, we recycled 28083 tons of class B Biosolids for our agricultural customers in rural Virginia.

D BIOSOLIDS MANAGEMENT PROGRAM:

The WWTP has implemented the Biosolids Management Program that includes a method of internal audit and independent third-party verification to ensure effective ongoing Biosolids operations.

AUDIT FINDING

In December 2019, the NSF-International Strategic Registrations conducted the ninth Interim Audit for the City, the lead auditor recommended that the City of Richmond maintains its platinum NBP certification.

Audit's results and actions taken in response to the audit results:

As a result of the 2019 audit there were no major nonconformance, 1 positive observation, and 4 opportunities for improvement!

Audit Results/Commendations	Responses/Corrective Actions
Element - 5 requirements 5-1 - Opportunity for Improvement –There is no monthly summary of the minutes of the monthly meetings to include date, time, attendees, discussion of overall performance in meeting KPIs, identification and praising those individuals who are star performers in each of the appropriate KPI categories, as well as individuals who are most improved on a monthly basis, discussion of what things went well, areas of concern, and action items.	**CAR Ref: 190-** The maintenance program manager commit to recording the KPI meetings in minutes that summarize the maintenance performance discussion. The minutes will include date, attendees, KPI discussion, weaknesses, opportunities for improvement, follow up actions, star performers and individuals showing the most improvement. The Biosolids supervisor will follow up with the maintenance KPI on a monthly basis and ensure that all meeting that pertain to the Biosolids area are being recorded.

Audit Results/Commendations	Responses/Corrective Actions
Element- 5 requirements 5.2 – Opportunity for improvement – Review the goal and objective for increasing grit removal to ensure that the baseline quantity of grit does not include screenings removed through the modification of the head works.	**CAR Ref: 191**- As of 12/23/19, the BMP updated 2019 data to reflect the grit removed at the head of the plant. The grit removed by grit channels is separated from grit removed by cyclones degritters and Screenings. As of November 2019, the monthly average of grit removed from the head of the plant is 73 tons. The Biosolids supervisor will maintain grit data separated for future analysis.

Element -14 requirement 14-1 – Opportunity for improvement- Consider rewriting the goal and objective addressing improvements in the maintenance management to include specifically measureable targets for each KPI currently being tracked, i.e. 1)avg. days to complete facility-wide work orders (for example the avg. time to complete work orders during any single month shall not exceed 16 days); 2) planned work hrs.-vs actual work hrs. (For ex. Actual work hrs. to completed work orders should not exceed 20% of estimated work hrs. for that work order); 3) the ratio of preventive maintenance actual hrs.-to- corrective maintenance actual hrs. (60:40 on a running annual avg. basis).	**CAR Ref: 193**- Updated goals and Objectives table with the maintenance goals: 1- Improve the average time of completion of Work Orders (W.O) at the WWTP to 30 days for each month. The 2019 annual average time was 37 days. 2- Improve the actual work hours to complete W.O not to exceed 20% the estimated hours. 3- Improve the ratio preventive/corrective maintenance actual work hours from 56/44 in 2019 to 60/40 in 2020 on moving annual average (12 months rolling average). The Biosolids supervisor will follow up with the maintenance goals on a monthly basis.
Element -14 requirement 14-1 – Opportunity for improvement- Consider having two or three plant personnel trained in ISO 14001- Environmental Management System Auditor Training so that they can supplement and eventually replace the current internal auditors as part of succession planning	**CAR Ref: 192**-The Plant Superintendent will assign at least two additional staff to receive EMS training and to be trained as internal auditors by August 2020. The Biosolids supervisor will ensure continuously that there is an internal auditor as backup to support the audit team.
Element- 11 Positive – The Biosolids Management Program has instituted a quarterly management review of its performance by the Deputy Director to ensure it's continuing stability, adequacy, and effectiveness; observations and weaknesses and recommendations.	The BMP team will discuss the progress of each of the goals and objectives as well as implementation of corrective actions.

E Goals and Objectives:

The City of Richmond Public Utilities Biosolids Management Program continued to improve and redefine its goals and objectives program. The Biosolids team established 8 SMART goals that cover each of the four outcomes focal points of the NBP program as identified below:

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

The Biosolids team has made some modification to the current goals.
Below is a table of goals and progress.

GOALS	PROGRESS
Lower the Average time of completion of Work Order at the wastewater plant by 5% from 40 in 2019 to 38 days for 2020	As dec-14, 8.7% of WO closed in 100 days and up, 7.8% closed the same day 86% closed in less than 1 week. As of Aug-15:- 4% WO closed in 100 days and up – 9.6% closed same day -40% in less than 2 weeks. Nov-16: 13/12/38 As of Feb-17 updated the goal and set 5% improvement. 2015:84 days 2016:37 days June-2017 Biosolids: 33 days. Oct-2017 Biosolids: 29 days. Oct-2018 Biosolids: 18 days. Sep 2019 WWTP: 40 days
Zero noticeable odors (less than 4 Dilution Threshold DT) in the gravity thickening area upon the start-up of the fermentation process.	-5/1/2014: completed The foul air system for the Gravity Thickeners - As Nov-14: System is ready to start and waiting to resolve some issues in the process of gravity thickening. May-16: odor control system in service. Sept-16 Ordered an Olfactometer. Oct-17: Operator started using the device to be more familiar with. Nov-18: stooped recording data due to short operation. Aug-18:Started recording data As of 10/13/19 DT=2
Improve the ratio Preventive/ Corrective maintenance work hours from 56/44 in 2019 to 59/41 in 2020	-Aug-15 Biosolids: 28/72 -Aug-16 Biosolids: 33/67 -June-17 Biosolids: 34/66 -Oct-17 Biosolids: 37/63 -Oct-18 Biosolids: 40/60 Sep-19 WWTP: 56/44
Obtain monthly average of 27% solids	As Dec-2017: Average: 26.2% Dec 2018: Average: 27.6% Sept 2019: average of 26.4% Dec 2019: average of 26.5

F Summary

The 2019 Biosolids Management Program was a completed success. Although not perfect, we were able to meet and very often exceed all Regulatory standards by a wide margin. We will continue to make tremendous strides to maintain the safely levels of all Biosolids handled through our plant. We have identified several opportunities to improve and will commence to tackle them immediately. We will not rest on our 2019 laurels as we aspire to set even better standards.