Biosolids Quality

Enhancement Plan

pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

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Biosolids Quality Enhancement Plan

INTRODUCTION

The beneficial use of biosolids has become a growing concern in Pennsylvania and throughout the United States. Discussions focus primarily on biosolids product quality, including the various physical, chemical and biological characteristics.

One method of addressing product quality is through the development and implementation of a Biosolids Quality Enhancement Plan (BQEP). Section 271.921 of the Department of Environmental Protection's (DEP) Municipal Waste Regulations requires generators operating under a general permit for the land application of biosolids that do not meet Exceptional Quality (EQ) standards to develop a BQEP. However, generators of EQ biosolids may also be required to develop a plan should the EQ product be malodorous and generate a public nuisance.

The goal of this plan is to determine what can be done to improve the overall quality and marketability of the biosolids product through an evaluation of wastewater and sewage sludge treatment processes. Once completed, the plan should present biosolids quality improvement ideas, assessment standards and goals.

PLAN STRUCTURE

There are several integral components that need to be addressed in determining pathways for biosolids quality improvement. Examples of suggested language have been provided as guidance in developing each component. Supporting documents should be attached to a developed plan, as indicated in the examples.

The components of the plan are as follows:

1. Physical, chemical and biological analysis and characterization of the biosolids

To improve biosolids quality, a characterization of the current biosolids product must be completed. Characterization involves evaluating the physical, chemical and biological properties of the biosolids.

Physical characterization should include both physical observations and supporting analytical data.

> ***Example***
> *The Smallville Wastewater Treatment Facility (WWTF) generates chocolate brown, liquid biosolids, with a slight earthy smell* (visual and odor) *and a percent solids ranging from 1.2 percent to 1.7 percent solids* (analytical).

Chemical characterization must be conducted using analytical methods. This information can range from the pH of the biosolids to the pollutant concentrations, including priority pollutant and hazardous waste determination data.

Example

Biosolids generated at this facility have had an average arsenic concentration of 3.5 mg/kg, with a maximum of 8.0 and a minimum of 2.0, based on data from January 1998 to December 2000. The trend for arsenic concentration has been on a downward slope during this time-frame. A summary and graph of the arsenic data are attached.

Biological characterization should also be performed using analytical methods. This aspect is mainly directed toward pathogen content and destruction. Although most treatments use process controls for pathogen destruction, back-up analytical data is suggested for a complete evaluation.

Example

Anaerobic digestion has been used at the Smallville WWTF over the past three years. A summary of the time and temperature monitoring during this time-frame is attached. Two sample events for fecal coliform were conducted during this time period for process verification. The geometric means for these sample events were 125,000 Most Probable Number per gram (MPN/g) (December 1998) and 98,000 MPN/g (July 1999). The sample results are attached.

The chemical and biological characterization should encompass data from the previous three years, or for a time-frame when data is available within the past three years.

This information is essential in making a complete evaluation of current biosolids quality and processes.

2. Evaluation of the impact of discharges on biosolids quality

Industrial discharges can be major contributors of substances that may affect the quality of biosolids being generated by a facility. All industrial discharges to a wastewater treatment facility should be evaluated and put under a pretreatment program if it is determined that the discharge affects operations or biosolids quality at the facility. This may not be required by federal pretreatment laws, but is in the best interest of the operator to conduct a thorough evaluation of all discharges. In addition to pollutants, other characteristics, such as biochemical oxygen demand, oil and grease, and total suspended solids, should be evaluated. These items may not directly affect the quality of the biosolids as determined through required monitoring, but can affect the wastewater and sewage sludge treatment processes. For example, excessive amounts of oil and grease may not affect pollutant concentrations, but may decrease the volatile solids destruction capability of the digester and decrease the overall aesthetic appeal of the final product.

Example

Borland Industries discharges approximately 2,000 gallons per day (gpd) of industrial wastewater to the Smallville WWTF. Borland Industries is a meat processing plant that generates one wastewater stream. The wastewater is generated from the washdown of processing equipment and typically contains elevated levels of soaps and fats, but minimal to nondetectable amounts of pollutants. A complete analysis of this wastestream is attached.

Not all WWTFs have traditional industrial discharges into their collection system. This should not preclude a complete evaluation of all discharges and overall condition of the collection system coming into the WWTF. Commercial and institutional facilities, such as restaurants,

schools, hospitals and other health care facilities, should be evaluated for discharges not consistent with traditional household wastes, such as oil and grease or radioactive wastes.

Other considerations include corrosion inhibitor chemicals, such as zinc polyphosphate, used by water treatment systems, residential septage and holding tank deliveries and inflow and infiltration.

Example

The Smallville WWTF accepts approximately 5,000 gpd of hauled liquid waste. This wastestream consists primarily of household septic tank and holding tank wastes. Two industrial discharges are permitted to be hauled in. A description and analysis of each of the industrial discharges is attached.

A thorough evaluation of the discharges coming into the WWTF and the potential impact on the final biosolids product will be useful in determining what steps may be necessary to improve the final biosolids product.

3. Measures taken by the biosolids generator to determine whether industrial discharges are in compliance with existing state and federal pretreatment laws

All discharges should be evaluated to determine whether they are in compliance with state and federal laws and requirements, as well as local ordinances.

A process should be laid out describing how and when each discharge is evaluated. This plan should describe monitoring practices, procedures, methods and frequencies. The plan should also describe what measures are taken when violations are found.

Example

Each restaurant connected to the Smallville WWTF is inspected twice per year to ensure that the grease traps at these restaurants are being operated and maintained properly. If violations are found, ordinances are in place (see attached) that permit the authority to assess fines. These fines may continue until the violation(s) is corrected.

4. Options to improve the physical, chemical or biological quality of the biosolids

Once the discharges to the WWTF and the biosolids quality have been evaluated, the next step is to determine methods to improve the biosolids.

This evaluation should take into account improvements to the overall aesthetic quality and marketability of the biosolids product. Ultimately, the intended end use of the product will drive the level of aesthetic improvement needed. Aesthetics include not only odor, but also appearance and manageability.

Questions to consider are:

- Will the biosolids be bagged or sold/given away in bulk?
- Will it be used at a home, golf course, farm or reclamation site?
- Will it be incorporated or top dressed?
- Will the site be isolated or close to other residences?

Once it is determined how the product will be distributed, the odor potential, appearance and consistency of the biosolids should be evaluated. For example: What does the product smell like? How long does the odor linger? How does the odor change over time? Are the biosolids wet and sloppy or moist and crumbly? Does the product spread evenly? How does it store? Does it stack or slump?

These lists are not exhaustive, but provide a starting point for evaluation. Failure to consider the aesthetic quality and end markets will have a serious impact on the viability of a biosolids marketing program.

In addition, for facilities producing Class B products, options for moving towards a Class A product should be considered in the analysis. If the facility is currently producing a Class A product, the evaluation should consider options for improving the overall quality of the final product.

All phases of the wastewater treatment process should be evaluated, including discharges, wastewater treatment and solids handling. This is essential since each phase can affect the physical, chemical and biological characteristics of the biosolids.

The best method of performing this evaluation is to follow the flow of the water 1) from the water supply to the household, industry or commercial facility; 2) to the discharge from the various entities; 3) through the collection system to the WWTF; 4) through the wastewater treatment process; and 5) through the biosolids treatment process.

Example

The correction of the inflow and infiltration problem would decrease the amount of grit coming into the WWTF, ultimately decreasing the amount that settles in the digesters. Decreasing the grit accumulation in the digester would increase sludge particle detention time, increasing pathogen and volatile solids destruction.

A wide range of options may be selected and will vary from facility to facility. For example, decreasing the amount of zinc polyphosphate added in the water treatment process may be an option for one facility to reduce the zinc levels in the biosolids. However, other options to decrease the zinc levels in biosolids may need to be explored for treatment facilities serving customers with private wells.

5. Evaluation of options

Criteria to determine the feasibility of options should be developed. A standard set of criteria will help evaluate each option on a level playing field. Criteria can include biosolids aesthetic appeal (including odor emissions), capital investment, short-term and long-term financial impacts, manpower involvement and community impacts. This is not an exhaustive list, since each WWTF and municipality or authority has individual issues and areas that may need to be addressed.

Impacts of quality improvements on other areas should be included in the evaluation. For example, lime stabilization may have greater pathogen destruction capability, but may also create a biosolids product that generates more odors and is therefore less aesthetically appealing.

6. Option selection

Each biosolids quality improvement option should be evaluated based on the criteria developed. After all the options are evaluated, a decision must be made whether the options are viable and whether the options can be implemented immediately or in the future.

An explanation of why an option was or was not chosen should be included. This exercise may also help in the future when conducting plant upgrades or new plant construction. A current restriction may not exist after upgrades or new construction.

Example

Based on the evaluation points, the Smallville Municipal Authority will be constructing and operating an on-site, captive composting facility for the biosolids being generated at the Smallville WWTF. The feasibility study attached outlines the evaluation points and how this selection was made. Construction of the composting area is projected to start in the spring of 2015, with the operation of the facility to start in the summer of 2015.

The plan should be reevaluated and updated if operational or physical plant changes occur that may alter the implementation of one or more of the options.

7. Methods used to analyze, evaluate and address potential sources or changes that may affect the quality of the biosolids

Changes to treatment processes and discharge sources that may affect biosolids quality must be evaluated. For example, increasing the WWTF flow from 0.5 million gallons per day (MGD) to 0.75 MGD may not affect effluent quality but may impact biosolids quality due to increased solids production and decreased detention times in digesters.

Therefore, different "what if…?" scenarios need to be addressed and a plan developed to evaluate each area, such as new industrial, commercial or institutional discharges; expansions of the collection system or plant upgrades.

As with other areas, this is not an exhaustive list since each facility is different and has different areas that may need to be evaluated.

PLAN DEVELOPMENT AND MAINTENANCE

The permit holder must develop a BQEP within one year of receiving a permit for the beneficial use of biosolids. The BQEP must be maintained at the facility, available for review during inspections and submitted when the permit for the beneficial use of biosolids is renewed.

Once completed, the BQEP must be revisited and updated every five years or as necessary to address significant changes or implementation activities. This plan should be used as a tool when

planning plant improvements or development. Due to the complex nature of the wastewater collection and treatment process, all activities, including remote activities such as expansions, should be evaluated to determine how they affect the biosolids quality at the facility.

For questions or assistance regarding the requirements or the development of a BQEP, contact the appropriate regional DEP biosolids coordinator.

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