

BIOSOLIDS/BIOGAS FACT SHEET

Introduction

In an effort to address some of the concerns expressed at the last RWAC meeting, RWRD has put together this document to provide background information about biosolids disposal on both a national and local level. This document will also provide an overview of biogas, how it is used in Pima County, and a recommended future use.

Biosolids Overview

Although effluent is an often sought-after product of the wastewater treatment process, biosolids, one of the by-products of wastewater treatment, is viewed as a disposal problem. Biosolids are produced through the treatment of organic matter and inorganic materials such as sand and grit. During the treatment process, these organic and inorganic materials are referred to as “sludge.”

According to EPA estimates, in 1997, the United States produced approximately 7.7 million dry tons of biosolids. As of 2002, about 60% of all biosolids in the US were applied to land as a soil amendment for growing crops.

Biosolids that are disposed of through land application are typically provided free of charge to farmers, allowing them to save money by not having to purchase fertilizer. Biosolids that meet the Class B pathogen treatment and pollutant criteria - in accordance with the EPA standards - can be land applied with formal site restrictions and strict record-keeping requirements. Through the use of land application, municipal sewage districts save money by not having to pay expensive landfill disposal costs of biosolids.

An alternative disposal method to landfilling or land application is incineration. However, air quality concerns coupled with challenges surrounding the disposal of ash, often preclude municipalities from pursuing this disposal method. In the State of Arizona, disposal by incineration is prohibited.

Although Pima County pays to have its biosolids hauled for land application, this disposal method is the most cost-effective disposal method available.

Local History of Biosolids Disposal

Prior to 1983, Pima County landfilled its biosolids; however, since 1983, the county has contracted with biosolids haulers to take and apply the community's biosolids on nearby agricultural lands. With nearby farmland just north of the Ina Road Wastewater Reclamation Facility (WRF), this arrangement has served Pima County well. However, in recent years, the conversion of some nearby farmlands into residential developments has caused the department to consider what would happen if availability of farmland began to shrink significantly.

In conjunction with the University of Arizona (UA), Pima County has also performed a pilot project that applied biosolids to mine tailings in the Green Valley area. The biosolids that were used for this project came from the Green Valley WRF. The application of biosolids on mine tailings provided promising results. Vegetation that had never grown on the mine tailings began sprouting in areas where biosolids had been applied. Unfortunately, the mining company that was accepting the biosolids has been inconsistent and not fully cooperative.

Until and only if this means of disposal can be fully developed, it cannot be considered a long-term viable option.

In addition to the UA's involvement with the mine tailings pilot project, the UA also has been very active in studying the impact of biosolids on farmland soils and the groundwater beneath the farmlands where biosolids have been applied. Although the pilot project on the mine tailings was brief, there are more than 20 years of data and studies associated with the application of biosolids on area agricultural lands.

Future Options for Biosolids Disposal

For the time being, the application of biosolids on agricultural lands appears to be the most cost-effective method of disposal. It costs Pima County approximately \$80 per dry ton to treat and haul its biosolids to agricultural lands; this is one of the lowest costs in the nation. In comparison, some communities in California pay over \$300 per ton to dispose of their biosolids.

Although there has been some loss of agricultural lands in Pima County, there is still enough nearby farmland to allow RWRD to continue this type of disposal method. However, should area agricultural lands dramatically decrease, RWRD is considering the use of biosolids on properties owned by the county.

The biosolids produced by RWRD today is a Class B product. Class B biosolids are significantly less expensive to produce than Class A biosolids, although there are far fewer restrictions and regulatory requirements surrounding the use of a Class A product. If in the future, federal or state regulations mandate the transition to the production of Class A biosolids, RWRD will be prepared to respond. However, significant research and marketing efforts would be required to "sell" biosolids (both figuratively and literally) to businesses and residents. It is important to be aware that a mandate to treat biosolids to a Class A standard would impact sewer user fees.

Biogas Overview

Biogas, another by-product of the wastewater treatment process, is produced through the anaerobic digestion of sludge in the wastewater treatment process. Biogas generated by the wastewater treatment process is comprised primarily of methane gas, carbon dioxide and siloxanes. Biogas can be used to generate power in a cogeneration facility, or it can be cleaned to a very high level through the removal of carbon dioxide, siloxanes and other impurities. Once cleaned, it becomes biomethane and can be added to natural gas pipelines that provide gas to a number of different customers. When cleaned to pipeline quality, biogas also can be compressed and turned into compressed natural gas (bioCNG) for use as fuel in automobiles and other vehicles.

Local History of Biogas Use

Today, RWRD uses all the biogas produced at the Ina Road WRF cogeneration facility to help power that facility. When the Ina Road facility became operational in 1979, the cogeneration facility provided all the electrical needs for the 25 mgd facility as well as on-site offices, warehouses, laboratory facilities, etc. However, when a 12.5 mgd expansion came on line in

2006, the co-generation facility could no longer meet all the electrical needs of the Ina Road site. Additionally, the once state-of-the-art power plant had operated beyond its serviceable life and was becoming increasingly difficult and expensive to operate and maintain.

Pima County beneficially uses biogas at the Roger Road WRF, although to a lesser extent, than at the Ina Road WRF. Because the Roger Road facility does not have a cogeneration facility that facilitates the full use of biogas, the biogas that cannot be put to beneficial use at the Roger Road facility is flared.

Future Options for Biogas

Pima County has a number of options for putting the biogas generated at both the Roger Road and Ina Road facilities to beneficial use. Because the facility replacing the existing Roger Road WRF will not treat sludge, the sludge generated at the new facility will be piped to and treated at the upgraded and expanded Ina Road WRF. In addition, sludge from the Green Valley WRF will be hauled and treated at the Ina Road WRF. This influx of sludge will increase the amount of biogas that will be generated at the Ina Road facility.

RWRD carefully considered the economics of upgrading and operating the existing cogeneration facility as well as the economics of constructing and operating a new cogeneration facility. In both scenarios, it was determined that power purchased from TEP was a more cost effective-option than an on-site power generation facility.

Even with the addition of solids from the new Roger Road WRF and the Green Valley WRF, there would not be enough biogas to fully power the expanded and upgraded Ina Road WRF. This circumstance would require the purchase of electricity from TEP to supplement on-site generated electricity. However, if RWRD were to forgo generating its own electricity and purchase all required power from TEP, it would benefit from cost-saving tariffs enjoyed by large users.

The following economic considerations were used in the decision to abandon the cogeneration concept.

- 1) The purchase of inexpensive electricity would be far more cost effective than the construction of a new facility or the upgrade of the existing facility.
- 2) There would be considerable ongoing expenses associated with the operation and maintenance of a cogeneration facility.
- 3) The cogeneration facility will not be able to produce all the electricity required to operate, the Ina Road WRF.
- 4) On-site back up power generation would be required at an additional capital expense or RWRD would have to pay an expensive standby tariff to TEP.

After analyzing the potential alternatives, RWRD recommends that Pima County enter a contract with a private sector firm to design, build, finance, own and operate a facility that would clean RWRD's biogas to pipeline standards. That company would be responsible for

selling the cleaned product - biomethane - to interested parties. In turn, the company would pay RWRD for the raw biogas it provides. These payments could help defer costs associated with the operation and maintenance of Pima County's publicly owned treatment works.