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**ANNUAL REPORT to the
SOLANO COUNTY BOARD OF SUPERVISORS**

LAND APPLICATION OF BIOSOLIDS in SOLANO COUNTY



**Prepared by the BACWA Biosolids Committee
December 2016**

Introduction

With the 2016 application season recently completed, the Bay Area Clean Water Agencies (BACWA) Biosolids Committee is pleased to present its annual summary report on land application of biosolids in Solano County. BACWA wishes to express its sincere appreciation to the staff of the Environmental Health Services Division of the Department of Resource Management for the continuing support of the biosolids land spreading program, which permits many of our member agencies to continue to apply biosolids to agricultural land in the County. We believe this partnership provides a valuable resource to the Solano County agricultural industry and provides many Bay Area agencies with an opportunity to cost-effectively beneficially use biosolids and make a positive impact on the environment.

This report provides information on trends in the use of biosolids resources in California and the Bay Area, an update on regional biosolids programs, and specific information on projects and other efforts by individual agencies currently applying biosolids in the County. This report highlights each agency's compliance with the requirement in Chapter 25, Article IV, Sec. 25-400 that "Class B biosolids may only be land applied provided that the generator of the Class B biosolids is individually or as part of a consortium having a portion of their biosolids produced as Class A Exceptional Quality biosolids, converting biosolids to energy, or otherwise diverting Class B biosolids away from land spreading or landfilling (as waste or as Alternative Daily Cover)." This report is intended as supplemental information to the report submitted by the County Department of Resource Management staff and by Synagro, contract haulers and appliers of biosolids.

This report has been prepared for the Solano County Board of Supervisors in response to the Board's request for an annual update on agency activities and progress towards compliance with the goals set forth in County Code (Chapter 25). The affected agencies have coordinated the required reporting through BACWA to produce a single report for the Board.

We would like to acknowledge the assistance of your staff in working with BACWA member agencies throughout the year, particularly Jeff Bell, Anthony Endow, Matthew Geisert, Misty Kaltreider, and Jagjinder Sahota.

Municipal Agencies Applying Biosolids in Solano County

The application of biosolids provides soil amendments and nutrients to enhance the productivity of the farmland using natural, recycled materials. Each agency that applies biosolids is required to meet strict standards and provides a report annually to the United States Environmental Protection Agency (USEPA) to demonstrate compliance. The following Bay Area agencies currently transport biosolids to agricultural land in Solano County under contract with Synagro:

Central Marin Sanitation Agency (CMSA)
City of Burlingame
City of Calistoga
City of Millbrae
City of Pacifica
City of San Mateo
Delta Diablo (serving Antioch, Pittsburg,
Bay Point)
Ironhouse Sanitary District (serving Oakley
and Bethel Island)

North San Mateo County Sanitation District
(Daly City)
San Francisco Public Utilities Commission
Southeast WPCP (SF-SEP)
Oceanside WPCP(SF-OSP)
Silicon Valley Clean Water (SWCW - serving
Belmont, Redwood City and San Carlos)
Town of Windsor
Union Sanitary District (serving Fremont,
Newark and Union City)

A total of 7,318 dry tons were land applied on agricultural sites in Solano County in 2016. The portion from each agency is shown in Figure 1.

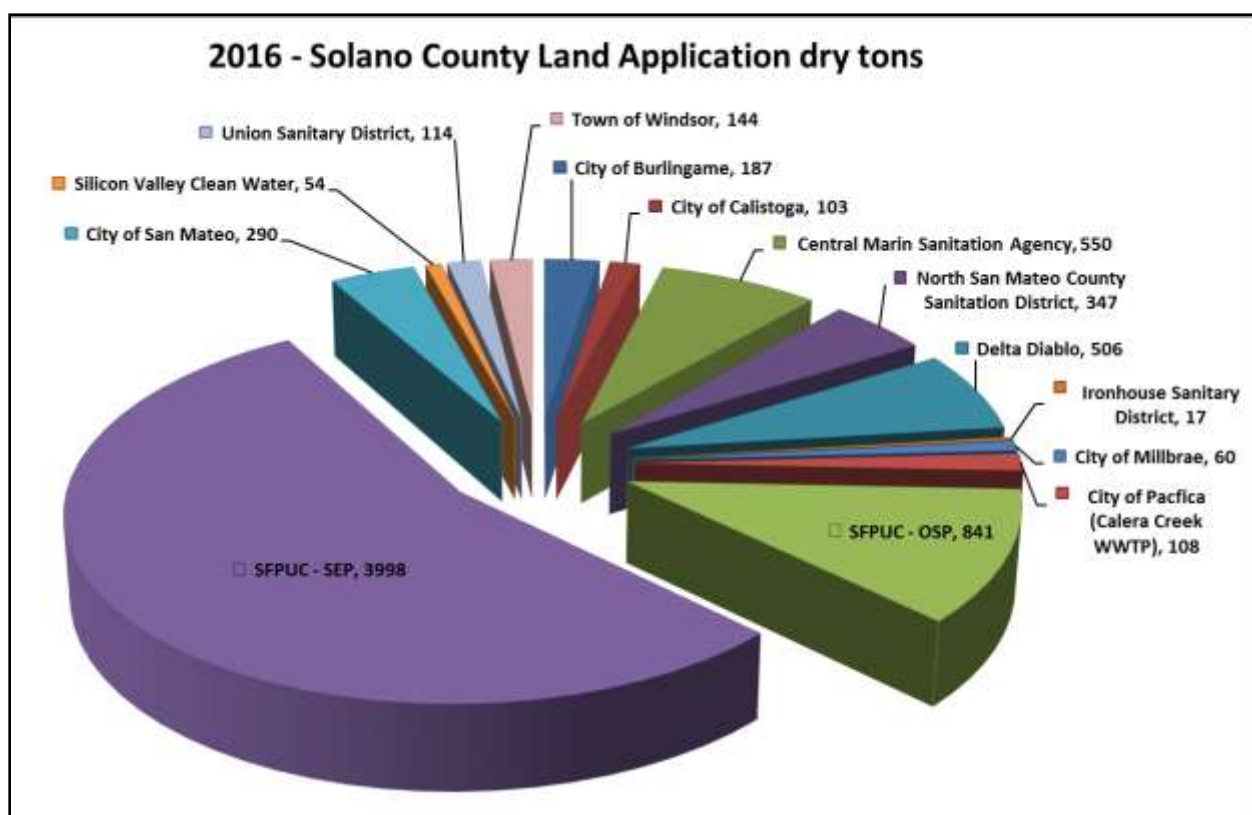


Figure 1. Amount of Biosolids Applied in Solano County by Each Agency in Dry Tons (2016). (Data provided by Synagro).

Data provided by Synagro indicates that the total quantity of biosolids applied to agricultural land in Solano County in 2016 was 14 percent greater compared to the 2015 application season.

Trends in Biosolids Usage in California

Wastewater agencies in California are continuing to identify and evaluate emerging options for biosolids reuse, recycling and disposal including technologies to extract energy and nutrients. However, traditional uses still dominate the biosolids landscape, primarily due to cost and reliability. Some agencies are also evaluating or implementing process changes to produce Class A biosolids.

Overall Use Summary. Figure 2 summarizes the use of biosolids in California for calendar years 2009 through 2015. Data for 2016 are not yet available and will be included in the 2017 report. The number one use statewide continues to be land application in various forms, including compost, Class B and Class A applications. From 2014 to 2015, land application of compost increased from 30 to 32 percent, land application of Class biosolids decreased from 25 to 18 percent, and land application of Class A biosolids increased from 9 percent to 11 percent. Biosolids have proven to be a safe, reliable and nutrient-rich soil amendment that offers a more cost-effective alternative to chemical fertilizers, which are increasingly expensive and very energy intensive to produce. Other significant methods for beneficial use and disposal include alternate daily cover (and other approved uses as a soil substitute) at landfills and landfill disposal.

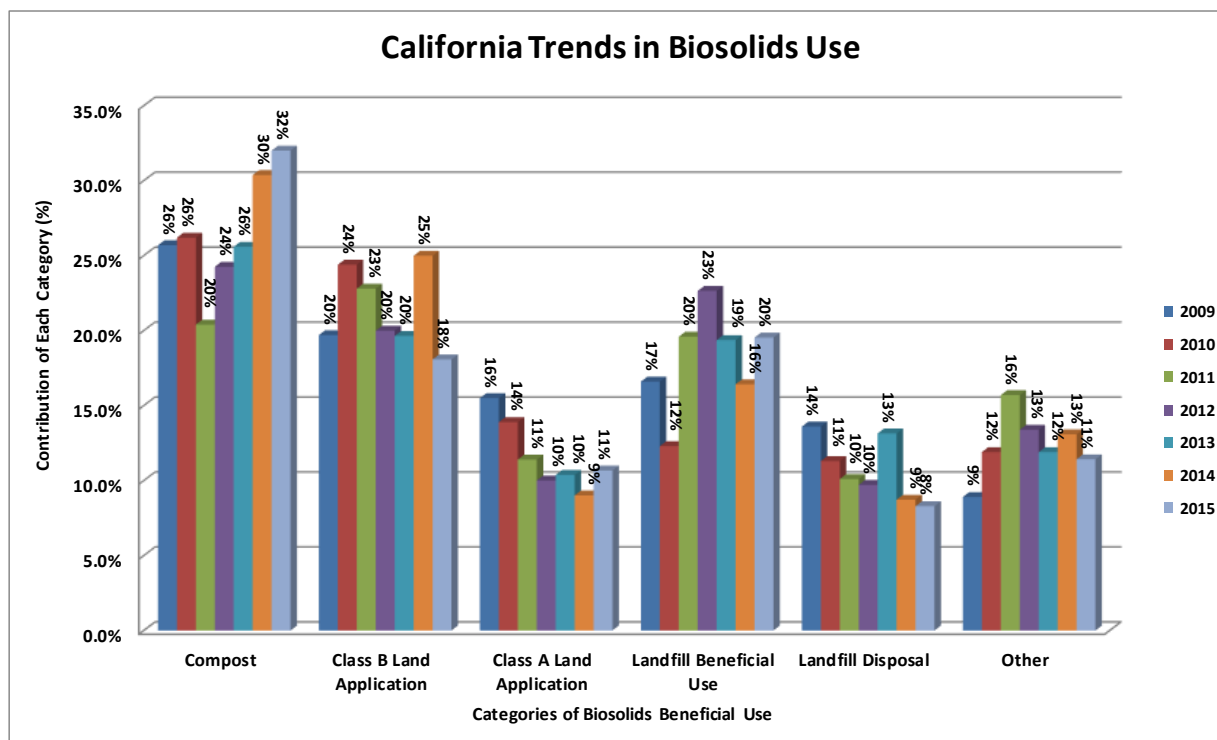


Figure 2. California Trends in Biosolids Use for the Years 2009 to 2015. (Data provided by EPA Region 9).

Bay Area Trends. In focusing on the Bay Area, Figure 3 illustrates uses of biosolids in the nine Bay Area counties. The primary uses continue to be landfill beneficial use, land application and incineration, which together account for over 90 percent of biosolids end uses in the Bay Area. Compost, landfill disposal, and surface disposal levels remained similar to 2014 percentages.

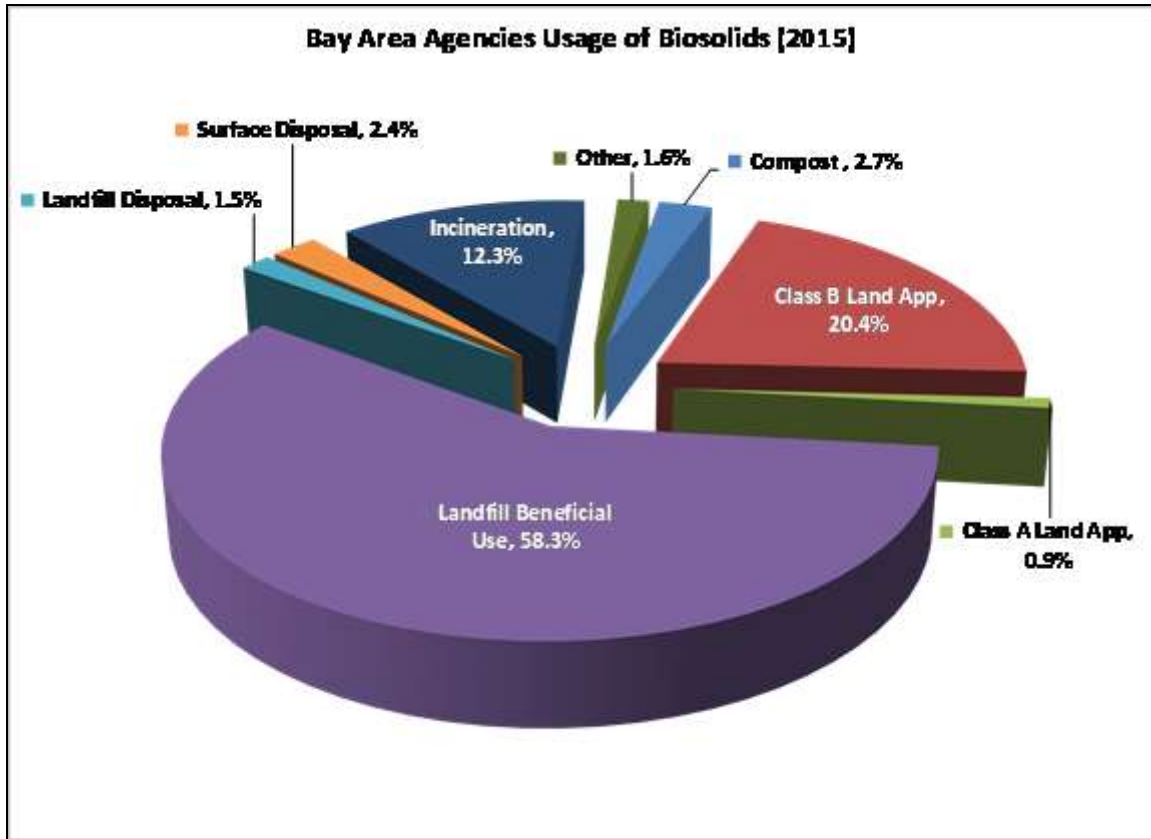


Figure 3. Bay Area Agencies Usage of Biosolids (2015). (Data Provided by EPA Region 9).
(The "Other" category typically includes storage.)

Biosolids were applied to agricultural land in four different Northern California counties in 2015 with Solano County ranking third at 10.7 percent, which is very similar to the previous year level of 7.8 percent. Figure 4 illustrates the distribution of land applied biosolids among the various counties.

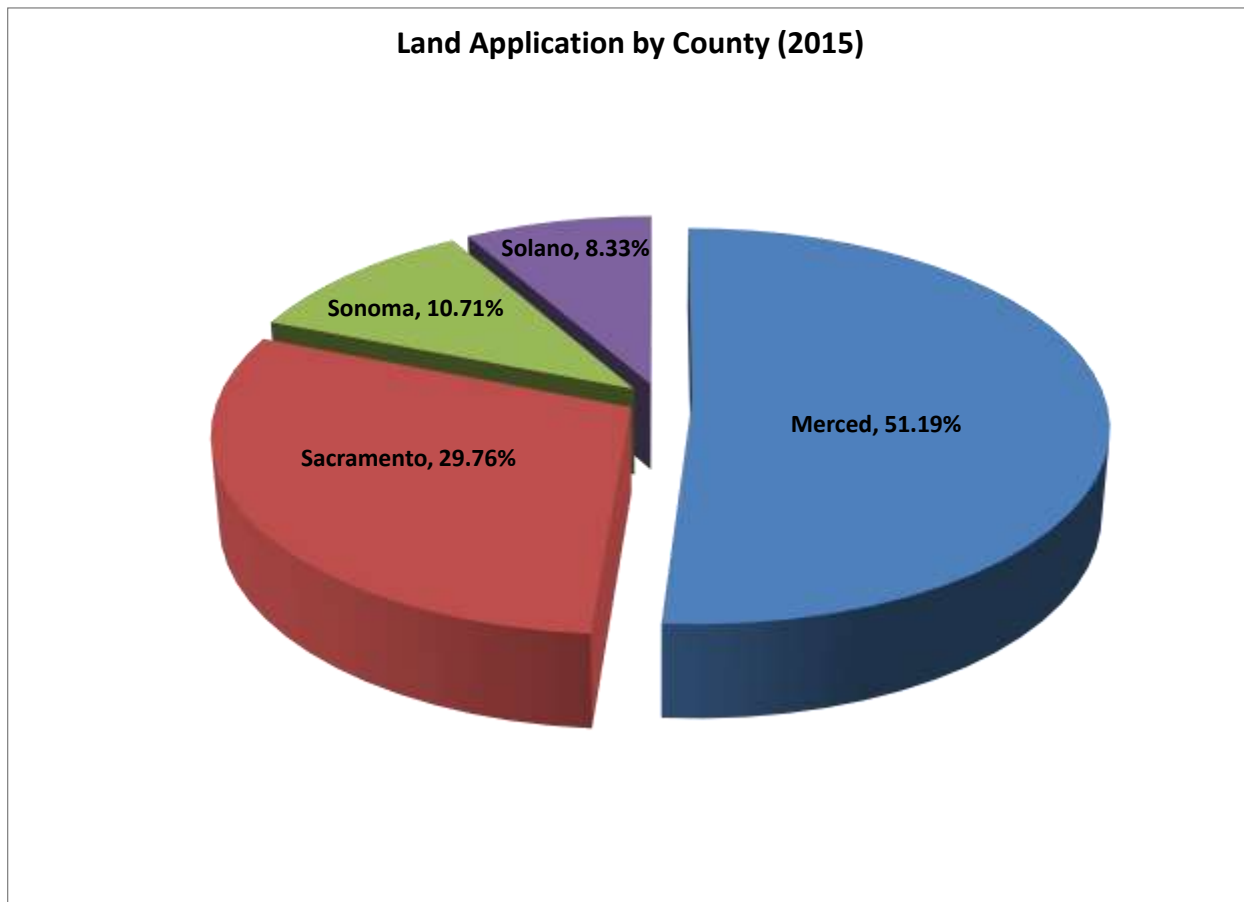


Figure 4. Distribution of Land Application of Biosolids among the Counties. (Data Provided By EPA Region 9).

Bay Area Regional Efforts

BACWA Biosolids Committee. The BACWA Biosolids Committee's (Committee) mission is to support the development and maintenance of cost-effective, sustainable biosolids management options for the more than 154,000 dry metric tons of biosolids produced in the Bay Area annually. The Committee continues to provide proactive support and information sharing to member agencies on regional biosolids issues, projects, and proposed regulations and legislation. The Committee holds quarterly meetings with an emphasis on biosolids technology information sharing among the participating agencies by providing facility tours and establishing a forum for vendors to present their products and technologies. In 2016, the Committee held four quarterly meetings. Two meetings were held at the Fairfield Suisun Sewer District, which included tours of its Organic Material Recovery Center during construction and operation. The Committee also met at the Central Marin Sanitation Agency and toured its Fats-

Oils-Grease (FOG) and High-strength Waste Receiving Station. The Committee issued a Biosolids Trends Survey to all BACWA members and is currently compiling the results to show the production rates, current uses, costs, and future plans for biosolids management across Bay Area agencies.

Bay Area Biosolids to Energy Program. The Bay Area Biosolids to Energy (BAB2E) Coalition originally formed in 2004 when a group of agencies came together to evaluate the feasibility of a regional biosolids management project to avoid the threat of a potential ban on land application of biosolids. By 2008, the membership expanded and the group decided to officially brand itself as the BAB2E Coalition to take advantage of opportunities anticipated to be developed under new state legislation (specifically, Assembly Bill 32 or AB 32). Assembly Bill 32 was adopted in 2006 requiring the state to reduce greenhouse gas (GHG) emissions to 1990 levels by 2020 (with further reductions by 2050). To achieve GHG reductions, the state created numerous programs incentivizing renewable energy and low carbon fuel production. This legislation served as a driver to prioritize the conversion of biosolids to energy over other Class A or B options, which also satisfies the Solano County Code requirements for land application of biosolids (Chapter 25, Article IV, Sec. 25-400), specifically:

“Class B biosolids may only be land applied provided that the generator of the Class B biosolids is individually or as part of a consortium having a portion of their biosolids produced as Class A Exceptional Quality biosolids, **converting biosolids to energy**, or otherwise diverting Class B biosolids away from land spreading or landfilling (as waste or as Alternative Daily Cover).”

A decade later, Governor Brown announced five overarching "pillars" by which he plans to achieve the 2030 GHG reduction target under Senate Bill 32 (SB 32). These pillars recognize that several major areas of the California economy will need to reduce emissions.

1. Reducing today's petroleum use in cars and trucks by up to 50 percent
2. Increasing from 33 to 50 percent our electricity derived from renewable sources
3. Doubling the energy efficiency savings achieved at existing buildings and making heating fuels cleaner
4. Reducing the release of methane, black carbon, and other short-lived climate pollutants
5. Managing farms, rangelands, forests and wetlands so they can store carbon

While the Coalition continues to be vigilant in ensuring the benefits of recycling biosolids for land application are understood, its mission is to also ensure there is support for innovative technologies that may be able to extract energy directly from biosolids, manage additional nutrient loading, and produce other value-added products.

The Coalition continues to develop the six subregional projects within the Bay Area that beneficially utilize biosolids as a renewable resource. Producing energy from biosolids remains an emerging field with multiple ongoing advancements in technology, research, and development currently taking place. The Coalition pursues a multi-pronged approach that includes:

- Investigating viable, year-long (weather resilient) alternatives to land application that look beyond "biosolids to energy" and seek to responsibly recycle back value-added products of biosolids to the environment.
- Educating the public on biosolids management issues in California through public outreach efforts, including the creation of a public website and securing media coverage.
- Serving as a technology incubator - particularly for pre-commercial technologies.
- Supporting land application in the Bay Area by seeking to create more capacity for biosolids in the Bay Area marketplace.
- Advancing the industry and legislative state of knowledge on biosolids as a valuable resource.

To achieve the Coalition objectives (listed above) and address critical challenges identified in the next two years, the Coalition will:

- **Build Relationships** - among members and local governments (e.g., Solano County), academia, legislature, state agencies, public, etc.
- **Achieve Project Maturity** - gaining experiences from the six existing subregional projects
- **Promote Product Development** - continuing to identify/develop technologies and other biosolids end use products that can be replicated by others

Current Coalition members are:

| | |
|------------------------------------|--|
| City of Burlingame | Fairfield-Suisun Sewer District |
| City of Livermore | Ironhouse Sanitary District |
| City of Millbrae | North San Mateo County Sanitation District |
| City of Palo Alto | San Francisco Public Utilities Commission |
| City of Richmond | Sausalito-Marin City Sanitary District |
| City of San Jose | Silicon Valley Clean Water |
| City of Santa Rosa | Union Sanitary District |
| Central Marin Sanitation Agency | Vallejo Sanitation District |
| Delta Diablo | West County Wastewater District |
| Dublin San Ramon Services District | |

Individual Agency Programs

Individual BACWA agencies are responsible for their own biosolids management programs and each develops its own plan in addition to participating in regional programs. Below are program highlights for many of the participating agencies. Note that while Fairfield Suisun Sewer District does not apply biosolids to agricultural land in the County, they are an active participant in both the BACWA Biosolids Committee and the BAB2E Coalition.

Many agencies that land applied Class B biosolids in Solano County either participated in the BAB2E Coalition and/or diverted a portion of their biosolids to Class A conversion facility (i.e.,

compost).

Central Marin Sanitation Agency. The Central Marin Sanitation Agency (CMSA) contracted with Synagro for land application of its biosolids during the dry weather season in Solano and Sonoma counties. CMSA also sends its biosolids to Redwood Landfill for landfill beneficial use, to Synagro's Central Valley Compost facility and to Lystek International for further processing to meet Class A biosolids requirements. CMSA continues to be a member of the BAB2E Coalition.

City of Burlingame. The City of Burlingame Wastewater Treatment Facility continues to contract with Synagro to land apply biosolids to farmland in both Sacramento and Solano Counties. The City continues to participate in the BAB2E Coalition.

City of Calistoga. The City of Calistoga produces biosolids according to 40 CFR regulations. At this facility, solids are processed by the treatment methods of thickening and application to drying beds. The material is land applied to various fields in Solano County by Synagro, and a portion of this material is diverted to produce Class A Biosolids at Synagro's Central Valley Compost Site.

City of Millbrae. In 2016, the City of Millbrae contracted with Synagro to land apply, compost biosolids or use as ADC. The City also continues to participate in the BAB2E Coalition and seeks further reuse and disposal options. The City accepts trucked-in restaurant grease trap waste (brown grease) for digestion. Millbrae, through Synagro, land applied approximately 60 dry tons in Solano County in 2016.

City of Pacifica - Calera Creek Water Recycling Plant. The City of Pacifica's Calera Creek Water Recycling Plant contracts with Synagro to land apply biosolids to farm land in Sacramento and Solano counties. In 2016, Synagro has land applied approximately 107.52 dry tons in Solano County. Calera Creek Water Recycling Plant utilizes Autothermal Thermophilic Aerobic Digesters. This type of digester system produces Class A biosolids. All of the biosolids sent to Solano County for 2016 were Class A biosolids.

City of San Mateo. All of the City's biosolids are beneficially used as either ADC, soil amendment, or compost feedstock. The City received a grant from the California Energy Commission in November 2014 to clean and utilize the biogas from the digestion process to produce compressed natural gas (CNG) for the City's vehicle fleet. The City anticipates producing 500 gas gallon equivalents per day.

Delta Diablo. Delta Diablo is an active participant in the Bay Area Biosolids to Energy Coalition, working to develop biosolids to energy technology alternatives for the Bay Area. Delta Diablo operates a recently completed FOG receiving facility, which boosts methane gas and energy production from its cogeneration plant. The addition of FOG to the solids treatment process is known to reduce the volume of solids produced through the digestion process. Delta Diablo continues to contract with Synagro for biosolids management.

Ironhouse Sanitary District. The Ironhouse Sanitary District (ISD) produces biosolids according to 40 CFR regulations. ISD's recycling facility is designed to produce Class B biosolids. In 2016, about 16 dry tons of ISD's biosolids were land applied to various fields in Solano County by Synagro.

North San Mateo County Sanitation District. North San Mateo County Sanitation District (Daly City) continues to contract with Synagro to land apply biosolids to farmland in both Sacramento and Solano Counties. Additionally, biosolids were diverted to Merced County for producing a Class A compost material. Daly City continues to actively participate in the BAB2E Coalition.

San Francisco Public Utilities Commission (Southeast and Oceanside). The Wastewater Enterprise (WWE) is one of three enterprises of the SFPUC. WWE marked its sixteenth consecutive season of land application of Class B biosolids in Solano County. Inspectors from the WWE perform bi-weekly land application inspections in Solano County to ensure that the contractors are following local regulations. In addition to Solano County, the WWE also land applies Class B biosolids in Sonoma and Sacramento Counties. WWE also contracts with Synagro to divert biosolids to Synagro's Central Valley Compost Facility in Merced County to produce Class A compost material. During the wet-weather season, biosolids from both plants were beneficially used at Vasco Road, Potrero Hills and Altamont landfills and land applied at Silva Ranch in Sacramento County.

Construction was completed in July 2016 for the upgrade of the digestion process at the Oceanside Water Pollution Control Plant (OSP) to a two-stage thermophilic/mesophilic process known as Temperature-Phased Anaerobic Digestion (TPAD) which will generate Class A Biosolids as defined by the 40CFR503 regulations. Thermophilic digestion in three digesters under flow-through mode was established in September 2016. Transition to a system-wide batch mode operation is expected to take place in early 2017 and the generation of Class A biosolids is expected in January 2017. The WWE is proceeding with its multi-billion dollar Sewer System Improvement Program <http://sfwater.org/index.aspx?page=116>, which includes a keystone project – complete reconstruction of the Southeast Water Pollution Control Plant's (SEP) Biosolids processing facility. WWE Staff and its consultant team (Brown & Caldwell, CH2MHill and Black & Veatch) have decided on Thermal Hydrolysis Pretreatment prior to mesophilic digestion to achieve Class A biosolids from the SEP. Completion of the new facility is expected in 2023.

The WWE continues to actively participate in the BAB2E Coalition.

Silicon Valley Clean Water. Through the end of October 2016, Silicon Valley Clean Water (SVCW) land applied approximately 45 percent of its Class B biosolids in Merced, Solano, and Sacramento Counties via contract with Synagro. SVCW also diverted approximately 13 percent of SVCW biosolids to a compost facility in Merced County. SVCW has also diverted approximately 7 percent to landfill for beneficial use in Solano County, and 35 percent to landfill for beneficial reuse in Alameda County.

In 2016, SVCW completed the Biosolids Drying Bed Improvement Project, in which the drying beds were graded and lined with concrete bottoms and lime stabilized soil on the sloped sides. New concrete decant structures along with a decant pump station were constructed as part of the project. SVCW also installed new Fournier Fan Press units for biosolids dewatering, which replaced an outdated centrifuge unit. Both projects are completed and operational.

Town of Windsor. The Town of Windsor Water Reclamation Facility contracts with Synagro to land apply biosolids to farmland in Solano County. The Town of Windsor is currently diverting a portion of its biosolids to Merced County for composting. The Town of Windsor continues to investigate feasible and cost effective Class A biosolids treatment and process options.

Union Sanitary District. Union Sanitary District (USD) beneficially used 100 percent of its biosolids in 2016 and met all USEPA regulations for the 23rd consecutive year. USD continues to contract with Synagro for its biosolids management, with approximately 70 percent of USD's biosolids land-applied to farmland in Sacramento, Merced and Solano Counties. Nearly 30 percent of biosolids production was delivered to Merced County for producing Class A compost. USD is one of 19 Bay Area wastewater utilities actively participating in the BAB2E Coalition.