Program/Facility Nominated:

Biosolids Pelletization Facility

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If selected for an award, how would you like the name of the organization to read on the award (limit of 50 characters)?

Solid Waste Authority of Palm Beach County

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2010 Applications must be submitted to SWANA no later than Friday, April 16, 2010

*** PLEASE NOTE THAT ENTRY REQUIREMENTS HAVE RECENTLY CHANGED ***

See the attached Entry & Eligibility Requirements sheet for further information

Application Checklist (Please make sure the following items are included in your submittal packet):

- Completed nomination form with signed release statement (this page), to be scanned and included in digital submission
- 1 copy of your award submittal on a CD-ROM OR via the SWANANET FTP site.
- Executive Summary of your nomination (NO more than 200 words)
- At least 2 pictures of your operation (may be included in nomination text)
- Check or credit card payment (made payable to SWANA) for nomination fee (in U.S. dollars)

Please mail all application packages to:

SWANA
ATTN: Technical Programs Department
1100 Wayne Avenue, Suite 700
Silver Spring, MD 20910

Release Statement: I certify that the information provided in this application is accurate and correct to the best of my knowledge. SWANA reserves the right to publish the enclosed information. Nominations become the property of SWANA. My signature gives SWANA the right to reprint or make available for purchase any portion of this submittal.

Signature: [Signature] Date: April 12, 2010
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Executive Summary

Wastewater utilities have long struggled with the ultimate disposal of their biosolids. Land application, incineration, and landfilling options are on the decline due to the desire for more environmentally-friendly alternatives. To reduce the amount of wastewater sludge applied within the Lake Okeechobee, Everglades, and Indian River Lagoon basins, a long-term solution was needed for the disposal of biosolids generated within Palm Beach County. The Solid Waste Authority of Palm Beach County (SWA), in conjunction with five major utilities in the County, developed a biosolids pelletization facility (BPF) to convert approximately 600 wet tons per day of aerobic, anaerobic, and undigested sludges into a high-value end product that can be beneficially used as a fertilizer additive.

During project planning, it was determined that landfill gas (LFG) from the adjacent Class I landfill could be beneficially used as fuel for the rotary drum sludge dryers. At project inception, the BPF was the first of its kind to be designed with the flexible fuel system of both natural and LFG. Utilizing renewable LFG has reduced operating costs, reduced flaring of LFG, and created a sustainable facility. The features of this project have made it a showcase for innovative concepts and successful regional partnerships.
Design and Construction

Land application of biosolids is currently on the decline. Negative perceptions of land application have resulted in public outcry and political action, forcing utilities to develop more creative, publicly accepted, and beneficial reuse alternatives. As such, a long-term solution was needed for the disposal of biosolids generated within Palm Beach County (County). The Biosolids Pelletization Facility (BPF) effectively recycles biosolids from the majority of utilities in the County into a high-value pelletized product that can be beneficially used as a fertilizer amendment.

The BPF was designed and constructed to process 600 wet tons of dewatered biosolids per day at a 15 percent solids feedstock. Biosolids, received from five municipalities throughout the County, are delivered via 40 cubic yard trailers into a sludge receiving area. The sludge receiving area—which is fully enclosed, odor-controlled, and automated—conveys biosolids, utilizing screw and belt conveyors, into two cake storage bins capable of holding 460 cubic yards each. Biosolids are transported from the cake storage bins into a pug mill, which combines it with dry recycled biosolids. This mixture enters one of two rotary drum dryers where biosolids are dried using landfill gas (LFG) to evaporate moisture within the rotary dryers. Each dryer requires a maximum hourly fuel supply of 34 million BTU per hour. Dried solids are screened using a separator cyclone. Oversized and fine pellets are recycled and combined in the pug mill with incoming sludge, as mentioned above. Pellets meeting the appropriate size criteria are cooled and transported to storage silos.

Site Suitability for a Landfill Gas Utilization

During project planning, the SWA team decided to locate the BPF at the North County Resource Recovery Facility (NCRRF) Site in Palm Beach County. This site was selected for multiple reasons. First, the site is immediately adjacent to the Class I landfill, which was flaring the LFG. This LFG could be utilized as a fuel source for the BPF, reducing the need for natural gas and thus reducing the operating costs of the facility. Second, the site is centrally located for the utility partners within the County, which helps to reduce hauling costs as well as greenhouse gas (GHG) emissions resulting from the hauling. Lastly, SWA had existing land available at the NCRRF site, which would help make the project more economically feasible for the utility partners. Ultimately, these three factors helped SWA conceive the BPF project on the NCRRF site.
Merits of the Design for Environmental Protection with “State-of-the-Art” Operation

The BPF effectively recycles biosolids into a high-value pelletized product that can be beneficially used. By reducing the amount of wastewater sludge that is land applied within the Lake Okeechobee, Everglades, and Indian River Lagoon basins, a portion of the phosphorous loading into these basins is eliminated.

At project inception, the BPF was the first of its kind to be designed with the flexible fuel system of both natural and landfill gas. This state-of-the-art concept required careful planning for the potential impacts of siloxanes within LFG. The availability of LFG gas is critical to the future economic success of the BPF. Additionally, due to the NCRRF’s location adjacent to residential neighborhoods, SWA incorporated extraordinary odor control techniques to minimize potential impacts on its neighbors. A comprehensive odor control system reduces odors generated from both the incoming sludge and the pelletization process, and a regenerative thermal oxidizer, heated using LFG, further helps by destroying odor causing compounds and organic vapors.

Overall Planning and End-Use Planning

A long-term, more sustainable solution was needed for the disposal of biosolids generated within the County. SWA, in conjunction with five major utilities in the County, sought to develop a regional facility that converted biosolids into a high-value pelletized product that could be beneficially used as a fertilizer amendment. By constructing a regional facility, the participating utilities realized capital cost savings from economies of scale.

LFG, generated as a result of anaerobic decomposition of putrescible Class I and Class III waste at SWA’s landfill, was previously extracted from the landfill and combusted in an open flare. Due to the proximity of the BPF to SWA’s LFG system, beneficial use of this energy was deemed a possibility. In order to successfully operate the facility with LFG, the quantity, quality, and availability of LFG had to be stable. Through an extensive analysis, it was determined that the use of LFG in the BPF’s burner system was possible. A LFG conditioning and compression system was designed to provide the required constant vacuum on the LFG extraction system and increase the pressure of the LFG to ensure that it would pass through the various gas conditioning stages, send it through the pipeline to the BPF, and ensure that it is at the proper pressure to be efficiently used in the BPF burners.
Since bringing the BPF online in August 2009, SWA continues to monitor and improve gas production not only for the environmental benefits of improved gas collection from the landfill, but also to improve the quantity and quality of the LFG fueling the BPF. This facility will provide a sustainable way to pelletize sludge generated in Palm Beach County for at least the next 20 years. This project has become a showcase for innovative concepts and successful regional partnerships.

Environmental Controls

**Landfill Gas Collection and Utilization**

LFG is extracted through a series of extraction wells and collection header piping. Previously, 100 percent of the collected LFG was combusted in an open flare. LFG, as extracted from the landfill, is saturated with water vapor and trace amounts of contaminants. Therefore, a LFG conditioning and compression system was designed to provide the required constant vacuum on the LFG extraction system and increase the pressure of the LFG to ensure that it would pass through the various gas conditioning stages, send it through the pipeline to the BPF, and ensure that it is at the proper pressure to be efficiently used in the BPF burners.

The LFG compression skid system is composed of a LFG compressor, a heat exchanger to reduce the gas temperature, a cooling/dehydration zone to remove moisture, and a filter to remove solid contaminants. The system also includes a recirculation system that supplies gas to a continuous pilot, allowing for a quick restart of the LFG flare when the BPF is not in operation.

**Overall Impact of the Program on Human Health, Environmental Quality and Resource Conservation**

SWA’s BPF fosters a public image of engineering excellence by minimizing the impact of land-applied wastewater biosolids on the Lake Okeechobee Drainage Basin, and, ultimately, the Everglades. In addition, the regional facility serves as a model for other communities by:

- Demonstrating how biosolids can be beneficially reused in a more suitable manner than current land application processes
- Showing how effective partnerships can reduce project costs, both capital and operating
- Utilizing LFG as a renewable fuel, which reduces operating costs to the utility partners while making the project more sustainable.
Compatibility with the Environment

SWA is committed to responsible social, economic, and sustainable design and, with the BPF, saw an opportunity to make a state-of-the-art, environmentally beneficial project even better. Compared to natural gas, the use of LFG as a renewable fuel for the dryers at the facility decreases operating costs to nearly $40 per ton.

This project also contributes to the protection and rehabilitation of water quality in the St. Lucie Estuary (Indian River Lagoon), Lake Okeechobee, and the Everglades by reducing non-point source pollutants in the Lake Okeechobee Basin. Furthermore, compared to traditional land application, the end product is being used as a natural, slow release nutrient source that can be added as fertilizer supplement for a variety of beneficial, environmentally-sound uses.

Regulatory Compliance

Role in Local Community’s Integrated Solid Waste Management System

SWA has built an award-winning integrated system of facilities that combines recycling, composting, converting waste to energy through incineration, and landfilling to effectively manage the County’s waste. In addition to the BPF, SWA’s system includes a waste-to-energy (WTE) plant, a landfill, a vegetation processing facility, a compost facility, two materials recycling facilities, household hazardous waste collection facilities, and a network of five transfer stations.

The programs developed and implemented by SWA are designed to integrate solid waste transportation, processing, recycling, resource recovery, and disposal technologies; protect the environment; achieve SWA’s 50 percent recycling and waste reduction goal; and inform the public about solid waste management issues.
While SWA is known for its garbage and recycling programs, they are also a major producer of renewable energy. The WTE facility reduces the volume of waste disposed of at the landfill while simultaneously using household garbage as fuel to produce clean electricity. By using LFG to fuel the BPF, SWA has demonstrated another way of utilizing renewable energy as an alternative to fossil fuels. The BPF is the first step in the beneficial reuse of LFG, and SWA is committed to increasing the use of LFG in the future.

**Environmental Compliance**

In-house testing for process control, feed, and product moisture analyses, in particular, are important to any drying operation. The scrubbers for PM and thermal oxidizers for CO and VOC have demonstrated control efficiencies. For example, scrubber control of PM is demonstrated by water flow and pressure drop, and the RTO control of CO and VOC is demonstrated by chamber temperature.

**Awards**

The BPF has been previously honored with awards from the Florida Institute of Consulting Engineers (FICE) and the American Council of Engineering Companies (ACEC). The BPF was a recipient of the 2010 FICE Engineering Excellence Grand Award and has earned the distinction of a National Finalist for the 2010 ACEC Engineering Excellence Award.

**Planning, Operations, and Financial Management**

**Description of Operation Program Used to Meet Design and Operational Objectives**

The development, permitting, design, and construction of the BPF were conducted in four phases. SWA hired a consultant to complete the preliminary design of the facility, develop design criteria, and eventually assist with the procurement of a design-build-operate (DBO) contractor. In addition to the tasks discussed above, the consultant helped SWA obtain over $3.25M in state and federal grant money.

Phase I of this project encompassed the preparation of a preliminary design and permitting of the facility. During this phase, a preliminary design report was prepared and a permit application for the SWA Power Plant Site Certification was prepared and submitted. The preliminary design report summarized the components necessary to construct a successful facility. Design criteria professionals ensured that the facility was designed and constructed to meet the overall program objectives.
Phase II of this project involved preparation of a Request for Qualifications (RFQ) and a Request for Proposal (RFP) for the facility, evaluation of the responses to both the RFQ and the RFP, and recommendation of an award to the DBO contractor.

In Phase III, SWA’s consultant assisted in design and construction oversight of the DBO contract, including:

- **Design Review** – Review of the DBO contractor’s preliminary design report, design drawings and specifications, as well as survey and geotechnical data.
- **Construction Review** – Construction review services related to submittals prepared by the DBO contractor.
- **Progress Monitoring** – Site visits, review of applications for payment, review of proposed change orders, maintenance of field reports, monthly progress meetings, and maintenance of comprehensive project records.
- **Acceptance Testing** – Review, observation, and monitoring of the acceptance tests performed by the DBO contractor.
- **Resident Project Representative (RPR)** – RPR prepared daily reports describing the general working conditions, areas of construction activity, tests performed, and special and unusual events.

**Estimated Operating Budget/Year**
The BPF is operated and co-funded by inter-local agreements between SWA and five municipalities within the County. Based on operating data since the facility opened in August 2009, SWA predicts an operations and maintenance (O&M) cost of less than $50 per wet ton.

**Does Facility Have Room to Expand and Create New Programs for Future**
The BPF has the potential to increase its usage of LFG to dry the sludge in the rotary drum dryers. Currently, the rotary drum dryers utilize LFG that is extracted, compressed, and transmitted from the Class I landfill. SWA plans to increase the supply of LFG by expanding the LFG system to include gas generated from the Class III landfill, which is currently flared. The result will be a combined Class I and Class III landfill gas stream, increasing the supply of renewable fuel to the BPF and thereby reducing the quantity of flared LFG.
Employee Health and Safety Training, Waste Screening Programs, etc.

All employees of the BPF are provided operating and safety training before beginning any operations at the facility. During operations, all employees are provided formal on-the-job training, which is critical to familiarizing employees with the facility. To ensure safety, the BPF requires that personnel with full authority to make operating decisions be available at all times. The BPF plant manager is the single point of contact with the SWA’s designated representation.

The BPF is operated and maintained consistent with the highest industry standards and practices, and in compliance with all federal, state, and local laws, rules, and regulations. The BPF’s building and site—including drainage structures, utilities, roads, and landscaping—are always kept in a state of good repair. The BPF is kept in a neat, clean, and litter-free condition to ensure the safety and welfare of its employees.

The BPF utilizes a computerized maintenance log program that automatically schedules work orders for routine maintenance, allows for log in of work orders and work completed, and allows tracking of historical maintenance and inventory. This program ensures the BPF maintains its high standard of operation.

Utilization of Equipment/Systems and Technologies

Types of Landfill Gas Equipment Being Utilized

The design of the BPF incorporated the use of LFG as the primary fuel source, thereby reducing the amount of gas that would need to be flared. LFG, as extracted from the landfill, is saturated with water vapor and trace amounts of contaminants. Therefore, a LFG conditioning and compression system was designed to provide the required constant vacuum on the LFG extraction system, as well as increasing the pressure of the LFG to ensure that it would pass through the various gas conditioning stages, pass the LFG through the pipeline to the BPF, and to ensure that the LFG is at proper pressure to be efficiently used in the BPF burners.

The LFG compression skid system is composed of the LFG compressors; a heat exchanger in which the gas temperature is reduced; a cooling, dehydration zone in which the gas is chilled below its dew point to remove water; and a filter to remove solid contaminants. The system also includes a recirculation system that supplies gas to a continuous pilot, allowing for a quick restart of the LFG flare when the BPF is not in operation.
Routine Maintenance and Employee Training on Equipment

The LFG collection system and control system require routine monitoring and maintenance along with proper employee training regarding operations. This maintenance is conducted for compliance with Florida Department of Environmental Protection (FDEP) and Environmental Protection Agency (EPA) regulations and, additionally, to optimize the system. This optimization of the LFG collection and control system ensures that the highest quality LFG is entering the BPF.

The LFG collection system requires monthly monitoring and routine maintenance, which is conducted by SWA staff. Design engineers are contracted to provide training and assistance to SWA staff.

The LFG control system consists of the compression skid and flare and their accompanying controls. SWA staff performs preventative maintenance on this equipment. The equipment manufacturer provided SWA with a schedule of the required maintenance, along with O&M manuals. Design engineers are contracted to provide assistance and training to SWA whenever needed in terms of conducting preventative maintenance and operating and maintaining the equipment.

Additionally, design engineers provide yearly formal training sessions with SWA LFG staff. Maintaining and monitoring the LFG system is critical for compliance and for fueling the BPF with high-quality LFG.

Public Acceptance, Appearance, and Aesthetics

Overall Appearance of Site

A crisp, clean, contemporary design solution was promulgated to dress up the tilt-up, a precast concrete exterior wall system chosen for its durability, speed of construction, and economy. In addition to its visual appearance, the BPF utilizes heavy landscaping to provide screening from nearby traffic and to make the site more aesthetically pleasing. All exterior pieces of equipment have additional screening to minimize the appearance of an industrial facility.
A comprehensive odor control system reduces odors generated from both incoming sludge and the pelletization process. This includes pack tower scrubbers to remove water vapor, particulates, and ammonia. Using alkaline/hypochlorite, the scrubbers can also aid in the removal of acidic and oxidizable odor-causing substances, especially odorous sulfur compounds such as hydrogen sulfide. A regenerative thermal oxidizer, heated using LFG, further helps by destroying odor causing compounds and organic vapors. Removing odors and vapors is important due to the proximity of residential areas.

The BPF is operated and maintained consistent with the highest industry standards and practices, and in compliance with all federal, state, and local laws, rules, and regulations. The BPF’s building and site—including drainage structures, utilities, roads, and landscaping—are always kept in a state of good repair. The BPF is kept in a neat, clean, and litter-free condition to ensure the safety and welfare of its employees.

Innovation and Creativity

_Innovative or Unique Aspects of the Facility_

The conceptual design and permitting of the BPF required forward-thinking and sustainable practices to deliver a regional solution to biosolids management. The solution was developed cooperatively between SWA and five utilities within the County; the participation of local utilities effectively decreases the cost per ton for each partner.

The most innovative application employed during this project was the use of LFG to fuel the system to pelletize the biosolids. In fact, this renewable energy project—which features LFG compression, dual fuel (LFG/natural gas) burner, and natural gas supply (backup)—was the first facility permitted in Florida to utilize LFG to pelletize biosolids.
What Makes This Facility Different from the Rest

The Biosolids Pelletization Facility is an exceptional example of an innovative and environmentally beneficial solution to biosolids disposal. Rather than land apply or landfill the biosolids—traditional approaches currently on the decline due to negative perception and public outcry—the Biosolids Pelletization Facility effectively recycles biosolids into a high-value pelletized product that can be beneficially used. The Biosolids Pelletization Facility has created several environmental benefits, including a reduction in the amount of wastewater sludge that is applied within the Lake Okeechobee, Everglades, and Indian River Lagoon basins and the elimination of a portion of the phosphorous loading to the Lake Okeechobee Drainage Basin and other environmentally-sensitive areas. The facility is unique in that it utilizes a renewable energy source in landfill gas to fuel its operations. The usage of landfill gas reduces the quantity of gas flared and the need for fossil fuels. These elements combine to make this project a sustainable, long-term solution for the disposal of biosolids generated within Palm Beach County.