INTRODUCTION
Pinellas County Utilities – Solid Waste Operations was formed in the mid-seventies as a partnership between Pinellas County and the 24 cities within the county. Under this partnership, the County took responsibility for the management and disposal of all solid waste generated within Pinellas County.

Solid Waste Operations is located on a 705-acre tract in central Pinellas County, known as Bridgeway Acres. The components of Solid Waste's multi-faceted programs includes a scalehouse, a hand unload area, an inspection pad ("hot pad"), a waste-to-energy (WTE) plant, an ash processing facility, a municipal solid waste Class I landfill, a bulk waste/construction and demolition debris (Class III) landfill, a yard waste recycling area, a household electronics and chemical collection center (HEC3), a recycling drop-off site, and associated environmental management facilities.

Additional services include an on-site Inspection and Safety Unit and an extensive public education program promoting residential and commercial recycling and waste reduction. Solid Waste Operations also has various off-site programs including an ocean reef construction program, recycling collection centers, mobile household electronics and chemical collection events, and mulch pick-up sites. Solid Waste Operations is currently implementing franchise collection in a portion of unincorporated Pinellas County.

Solid Waste Operations is an enterprise system, operating like a business, and receives no funds from the Pinellas County’s tax base. Solid Waste Operations is funded through user disposal fees, capacity payments from Progress Energy Florida (PEF), and the sale of electricity and recovered metals. The current tipping fee of $37.50 per ton has been held constant since 1988. In 2005, over 1.2 million tons of waste were managed at Bridgeway Acres.

WTE BACKGROUND
When Pinellas County, Florida took the bold step in the late 1970's to pursue an alternative to traditional solid waste landfill disposal, their vision into the future would result in one of the largest and most cost effective waste to energy facilities in the world. With the 705 acre Bridgeway Acres (BWA) property available, the County entered into one of the very first "full service procurements" for a major domestic WTE facility. As a result of that procurement process, the County selected United Oil Products (UOP), later to become known as Wheelabrator Pinellas Incorporated (WPI), for a turnkey project to design, build, and operate two 1050 tons per day mass-burn waste-to-energy units. The steam production from these combined units was used to power one 50 MW turbine/generator (TG). Commercial operation began in 1983. At approximately the same time,
the County made a commitment for a third identical unit and matching 25 MW TG which went into operation in 1986.

Over the history of the Waste-to-Energy facility (WTE), several major capital improvement projects have been completed to provide environmental compliance and to improve and sustain continued operations of the facility. In the late 1990's, the Air Pollution Control (APC) retrofit project was successfully completed and demonstrated full compliance with the emissions guidelines established by the 1990 Federal Clean Air Act Amendments. As a precursor, to provide space for the APC project systems and equipment, it was necessary to relocate the residual ash Material Recovery System (MRS), which at the same time was also upgraded in capacity and provided with a fully enclosed building referred to as the Ash Storage and Processing Building (ASPB). Shortly following the APC project, the County undertook another project to refurbish and modernize selected plant systems in order to improve availability of the plant. This project became known as the Capital Replacement Project (CRP) and was more fully described in the NAWTEC10 paper Pinellas County Resource Recovery Facility, Capital Replacement Project.

With these major investments, the County has achieved a substantial reduction of solid waste volume landfilled at BWA, and recovered both energy and ferrous and non-ferrous materials from waste. The County is positioned to continue to utilize the landfill with build out capacity well into the middle of the 21st Century.

In 2007, upon expiration of the current operating and maintenance agreement with WPI, the County intends to enter into a new contract, with a 17 year term. The competitive selection process is currently well underway.

**FUEL RECEIVING AND COMBUSTION**

Pinellas County annually receives over one million tons of municipal solid waste at the BWA Solid Waste Management complex on a weekly schedule of Monday through Saturday, except for selected major holidays. The Entrance Scale House, operated by the County, continually coordinates with WPI to direct solid waste haulers to the WTE tipping floor area for unloading. The tipping floor consists of two areas; the first being an open air entrance and exit area for vehicle staging and maneuvering. The second is a covered area known as the tipping building that provides 7 large overhead doors for vehicles to back into at the direction of a WPI representative. Inside the tipping building haulers unload their vehicles into the waste pit and onto the tipping floor. Front end loaders are utilized to manage waste inventory on the tipping floor and entry into the waste pit, including segregation of non-processible waste materials. As part of the CRP, the Tipping Building was modified to its current arrangement from the original design of vehicle entry only at the south end and exit at the north end of the building. The current arrangement provides improved traffic flow and reduced congestion and delays. Over 1,000 vehicles per day, on average, use the BWA facility for waste disposal.

Once solid waste is deposited in the pit area, control of material management and processing is assumed by the Crane Operators. Three crane trolleys on a common gantry rail system, each equipped with a 15-ton capacity orange peel type grapple, are utilized to charge the waste feed hoppers of the three boilers. Normally only two of the cranes are in use at one time to provide fuel feed and manage the inventory of the 30 foot deep pit. Total storage capacity of the pit area supports full load operation of all three boilers even for a period extending over a 3-day holiday weekend. As part of the CRP, the crane trolleys were upgraded to their current capacity and new Crane Operator pulpit type chairs with joystick controls were installed.

The foundation of waste combustion for each unit is a multiple zone grate system provided by Martin GMBH of Munich, Germany. At a rated throughput capacity of 1050 tons per day, this grate system is the largest of any mass-burn facility in the United States. The source of combustion air is provided by forced draft fans which take
their suction from the Charging Building, offering a slight negative pressure from the outside as a means of odor control. As part of the CRP, the original step-type grate control system was upgraded with a proportional control system along with a pyrometer based furnace temperature monitoring system that results in more refined and stable level of combustion control.

STEAM & ELECTRICAL ENERGY PRODUCTION
Each of the three furnace/boilers designed by D.B. Riley (now known as Riley Power, Inc.) has a maximum continuous rating (MCR) of 244,000 lbs/hr of steam at 615 psia, 750°F, based on a municipal solid waste fuel with a higher heating value of 4800 BTU/lb. At over 43 ft. wide, the furnaces are the largest mass burn units in the U.S. The steam generation system consists of a four pass system, including an evaporator, superheater and economizer section. As part of the APC retrofit project, the overfire air system on each boiler was modified in conjunction with the installation of two natural gas fired auxiliary burners, each rated at 65 million BTU/hr. During the CRP, each boiler was rebuilt on a sequential basis to entirely replace the last 3 passes and the roof of the furnace, excluding drum replacement, resulting in the current MCR design conditions. The steam generation system improvements made as part of the CRP have increased the overall RRF availability levels to the 90 percent range.

The superheated steam produced by each boiler is directed to its respective T/G unit. Each generator produces electrical energy at 13,800 volts, which is transformed to 230,000 volts for sale under a long term contract to Progress Energy Florida. Approximately 15 percent of the electrical energy produced is consumed within the Facility. As a result of the increased performance realized from the steam generation system following the CRP, the T/G units are operating at near rated production levels. These levels have not been achieved since the units first became operational.

AIR EMISSIONS COMPLAINECE SYSTEMS
The WTE facility has been in compliance with federal mandated and state enforced environmental air emissions standards since it initially went into operation. As a leader in the environmental permitting process, Pinellas County was the first in the State of Florida to receive a Title V Operating Permit for the Facility in 2000. Similarly, in 2005 the County was the first to obtain a renewal of this Title V Operating Permit.

Originally all three units were equipped with electrostatic precipitators to remove particulate matter. Beginning in 1997 as part of the APC retrofit project, Spray Dryer Absorbers (SDA) and Fabric Filters (FF) were installed on each unit for control of acid gases and particulate matter, specifically to minimize unit outage periods during this retrofit, Unit No. 3 was chosen as a starting point. The Unit No. 3 APC train was constructed along the north side of its operating precipitator followed by a final 6-week outage for decommissioning the precipitator and connecting in the APC ductwork. Subsequently, the Unit No. 3 precipitator was demolished to make room for the Unit No. 2 APC train and the sequence through Unit No. 1 followed in a similar manner. This is the reason the APC trains are offset to the north of their respective boiler units.

The removal of acid gases in each SDA is accomplished by the introduction of atomized lime slurry through multiple injection lances into the top of the SDA vessel where boiler exit flue gas enters. Three (3) 800 hp rotary air compressors supply the required atomizing air to the injector nozzles.

The FF system on each unit consists of 12 separate modules, each containing 180, 24 feet long, 8 inch diameter bags. Ten (10) modules are required to support unit full load operations. This allows for 2 modules to be out of service at any one time for either cleaning or maintenance. Bag cleaning in a FF module is accomplished by a shaker system and by isolating the module with dampers in the inlet and outlet gas ducts and then admitting a separate air supply flowing in the reverse direction of
normal gas flow. Particulate matter is released into a hopper at the bottom of the module.

To provide control of emissions of nitrogen oxide (NOx), dioxins/furans and heavy metals, two other systems were installed as part of the APC project. For NOx emissions control, a urea based Selective Non-Catalytic Reduction System (SNCR) conveys a diluted solution of urea to injector lances inserted through ports in the water walls on either side of the upper furnace areas. Emissions of dioxins/furans and mercury are controlled by a powdered activated carbon injection system (PACIS).

In accordance with regulatory requirements, the WTE Facility is equipped with a Continuous Emissions Monitoring System (CEMS), which includes sample recovery lines to sampling points on each unit. Inlet sample points for each APC train are located near the carbon injection point at the exit of the boiler economizer. Outlet sample points are on the inlet duct to the Induced Draft (ID) Fan located at the base of the stack. Annual stack testing of all regulated emissions parameters is conducted annually. Due to its excellent environmental compliance record, the Facility is eligible for reduced frequency of stack testing for dioxins and furans, in accordance with EPA rules.

ASH PROCESSING & RESOURCE RECOVERY

The complete combustion and emissions control process results in a variety of ash residue sources. Bottom ash is the residual material remaining at the bottom end of the furnace grates after the full residence time for combustion has been completed. This ash is deposited off the grates into one of two Ash Expellers where it is quenched with water and discharged onto the Vibratory Conveyor. Other finer ash residue material that filters through the grate elements, known as riddlings, is collected at numerous points, quenched and deposited onto the Vibratory Conveyor. A portion of ash that becomes entrained in the flue gas stream, referred to as fly ash, falls out of the stream at the bottom of the Superheater section, is collected in hoppers and discharged into the Ash Expellers. Ash from these three sources continues on the Vibratory Conveyors to the Conveyor Gallery.

Through the course of the flue gas path to the stack, other fly ash products are collected, including at the bottom of the Economizer section of the boiler, at the bottom of the SDA and below each FF module. A continuous operating network of ash conveyors collect ash from these collection hoppers and are consolidated onto one final conveyor that carries the material into the Fly Ash Treatment Building (FATB). In this building, the ash product enters a pugmill where it is combined with a phosphoric acid solution in a patented process that conditions the material to meet the Toxicity Characteristic Leaching Procedure (TCLP) test requirements for landfill disposal. From the FATB the treated ash is deposited on the Conveyor Gallery conveyor belt to be combined with the bottom ash stream where it continues into the ASPB for further processing and material recovery.

Once in the ASPB, the combined ash stream enters the MRS system. A series of classification methods, both automated and manual are used to separate ferrous and non-ferrous materials from the ash stream. The remaining bi-product is then hauled to the BWA landfill areas to be used as daily cover material. Recovered materials are sold for recycling in other area markets. In the late 1990's, the County also began accepting processed ferrous materials recovered from other area waste-to-energy facilities, known as Out of County Metals (OCM), for final processing and cleanup of the ferrous product. Under our new contract, the acceptance and processing OCM will be discontinued and the existing ASPB and processing equipment will be replaced.

WATER MANAGEMENT

Pinellas County has always been proactive in efforts to conserve and efficiently utilize water resources in the WTE facility and within the confines of the BWA landfill. By FDEP permit, the entire landfill is entirely encompassed by a bentonite slurry wall that is keyed into the natural
subsurface confining layer forming an effective containment of all site surface and subsurface water. In 1994, the County completed a major water management project which created water conveyances around the landfill property that collect and direct surface water to a large retention pond on the northwest corner of the property, called Pond A. At the southwest corner of Pond A, a pumping station was installed which forwards water to the Lime Softening System (LSS) at the RRF, where it is conditioned and used for cooling tower makeup to replace water lost to evaporation. In this way, use of the alternative source of makeup from the reclaim water systems supplied by the Cities of Largo and St. Petersburg can be minimized.

Makeup for the high purity water used in the boilers to create steam is a large demand on water resources as the average monthly consumption of 2.2 million gallons in 2005 typifies. To replace water lost to boiler blowdown, steam vents and miscellaneous leaks, high quality makeup water must be produced. In 2002, a supplemental water treatment system was installed. The pre-treatment system utilizes a microfiltration and reverse osmosis (RO) process to condition reclaim water to a quality equal to and even better than the utility potable water supply for use in the demineralizer system. This approach has been highly successful in conserving the premium supplies of utility potable water and reducing operating costs.

COMMAND CENTER

As one enters the Main Control Room (MCR), the office atmosphere encountered is much different than that of the industrial climate experienced in other areas of the Facility. As part of the CRP, the control room environment was enhanced with noise and dust control measures, and new architectural treatments throughout. Its current appearance is that of a modern, state of the art control center.

The platform for the Facility controls is an Infi-90 Distributed Control System (DCS) manufactured by Bailey Controls, Inc. The DCS was initially introduced in conjunction with the APC project. Building on this network foundation, the balance of the control systems were upgraded from the original discrete panel board mounted electrical and pneumatic controls to this state-of-the-art microprocessor based technology as part of the CRP. This distributed control approach offers a high level of reliability for continued system operation in the event of a loss of one of its local process system interface locations; which allows that part of the process to be manually attended until that portion of the DCS is restored to service. Efficient and comprehensive human-machine interface (HMI) stations in the MCR offer extensive information and control capabilities to the Operator.

CONCLUSION

We of Pinellas County are very proud of our WTE facility. It is the cornerstone of our integrated solid waste management system in the County serving over one million people as well as our visitors who come to enjoy the attractions of the County. The WTE facility will continue to be the cornerstone of our solid waste management system well into the future.

We welcome you to Pinellas County and hope you enjoy the tour of our facility.