City of Tampa, McKay Bay Retrofit; Before and After

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History
The City of Tampa’s solution to solving their waste disposal problems started almost 30 years ago. A conventional refractory lined incinerator equipped with a wet quench scrubber was constructed and operated by the City, starting in 1965. The old incinerator would often belch black soot and smoke and in 1979 was shutdown for environmental concerns. The City selected Waste Management Energy Systems, then a subsidiary of Waste Management Inc., to design, build, and operate for 20 years, a tried and proven waste combustor linked with a heat recovery boiler, electrostatic precipitator, and a turbine generator. This system was placed into operation in 1985 and the last two units were operated until July 2000 when compliance with the Clean Air Act required their retrofit. In 1996, the City assembled a Project Team consisting of consultants that specialized in various aspects of solid waste disposal including: permitting, design, operations, and construction oversight. After several years of design, procurement, and negotiations, Wheelabrator was selected as the successful vendor to design, construct, and operate the retrofitted facility. Construction began in April 1999 and went into commercial operation in January 2002.

Design Criteria
There were several key items developed during the procurement process to make this a successful project. The primary concern was to not only meet the new emission limits, but also to maximize steam utilization within the existing power generation system and to provide a dependable waste combustion/steam generation system. This paper will focus on some of the key elements relative to the furnace/boiler design to reduce erosion and corrosion of the boiler tubes and reduce fouling. The key items were:

1. Establish maximum flue gas velocity limit of 20 feet per second in all gas paths at 110% maximum continuous rating under fouled conditions.
2. Set the maximum flue gas temperature entering the superheater as 1250 degF.
3. Specify minimum materials of construction i.e. alloy grates, high chrome superheater tubes, refractory materials, abrasion resistant plating, etc.
4. Increase minimum corrosion allowances 1/16 th (.061) inch above the minimum ASME requirement.
5. Conduct design review stages including cold flow modeling of furnace/boiler between the owner, designer, constructor, and operator. During the cold modeling test, several areas were identified that would cause high erosion. This resulting in the addition of chevrons and deflection vanes in the boiler passes.
6. Established access and inspection requirements. By specifying the number and location of access and inspection doors, it is possible to readily clean and inspect the boiler tubes and ash hoppers.
Operating Performance
How does the facility operate now in comparison to the old technology? This paper will show and indicate the enhancements that were made to efficiency, availability, and emissions. Refer to the following charts:

1. Throughput Comparisons
2. Steam Generation Comparisons
3. Electricity Produced Comparisons
4. In-House Electricity Usage Comparisons
5. KWh/Ton Comparisons
6. Availability Comparisons
7. Emission Results/Comparisons

Summary
Through January 2003, over 600,000 tons of solid waste has been processed by the retrofitted boilers since start-up. The combustion lines are removed from service every six months for a three to five day outage. There have not been any serious fireside deposits observed or indications of tube corrosion to date. A baseline tube thickness program was performed by the facility and is followed by an annual re-test of each boiler. A UT survey performed in February 2003 did not show any signs of tube wastage. Obviously as with any facility, the true test is after years of operation. The first two retrofitted units have been in operation for 30 months and averaging approximately 97% availability. The boilers are cleaned with percussion on-line blasting every 3 months. This cleaning, coupled with a combination of stationary soot blowers and rappers, have eliminated the need for corrosive and unsightly water washing. Until then, we can only track and compare the results to the baseline data and attempt to predict the long-term availability and performance.

Speaker Brief:
Sherman “Pat” Patton is employed as a Senior Project Specialist with Malcolm Pirnie, with his office located in Ybor City, Florida. He currently works on a variety of resource recovery projects for municipal clients. Additionally, Mr. Patton has over 30 years experience in both the public and private sectors. Mr. Patton is a U.S. Navy veteran, and began his private career as a boiler operator for TVA having served their two-year apprenticeship program. Mr. Patton was a pioneer of sorts in the Waste to Energy field by starting with Nashville Thermal for five years in 1974. This was followed by working as a start-up engineer, project engineer, and project manager at waste-to-energy facilities such as Waukesha, WI, Gallatin, TN, and again at Nashville Thermal. He has held the positions of maintenance manager, operations manager, and plant manager in various waste-to-energy facilities and was the plant manager in Hamm, Germany, when the first WTE was retrofitted to meet the new German 17 BimSchV (the equivalent of the USEPA 1995 Clean Air Act). Mr. Patton has administered a diverse range of programs related to municipal solid waste management, paint waste recycling, and refinery hydrocarbon sludge and soil remediation. Mr. Patton presently serves as an executive committee member of the ASME Solid Waste Processing Division and is an ASME QRO.