13th North American Waste to Energy Conference
May 23-25, 2005, Orlando, Florida USA

NAWTEC13-3162

McKAY BAY REFUSE-TO-ENERGY FACILITY SPLIT-RANGE CONTROL SYSTEM

Mark P. Schwartz, Plant Manager
Wheelabrator McKay Bay, Inc.
107 North 34th Street, Tampa, Florida 33605
Ph 813-248-1457 Fx 813-247-2052 Email mschwartz@wm.com

ABSTRACT

The McKay Bay Refuse-to-Energy Facility underwent a three-year retrofit program completed in 2001. The major portion of this work involved the replacement of all four combustion trains. The existing turbine generator set, rated at 22.5 MW, was retained. Each of the four boilers had a maximum continuous rating (MCR) of 62,186 lb/hr of steam; i.e., 248,744 lb/hr with all boilers in operation. The turbine generator operated at about 220,000 lb/hr (about 93% capacity), thus allowing for load swings due to fuel inconsistencies. As a result of the difference between the boiler MCR and the rate into the turbine, excess steam (over 26,000 lb/hr) was sent to an existing bypass (dump) condenser.

Upon installing a new automatic governor control system for the turbine during the retrofit, the potential for providing additional control capabilities was realized. Utilizing an available second control feature on the governor control system, a major portion of the bypassed steam could be sent to the turbine via an innovative split-range control system configuration. The formerly bypassed steam was now added to the energy recovered, and had a positive effect on the net kwh/ton of waste.

This paper discusses the research, design and installation of the split-range control system, as well as the economics of the project. The capital cost of this system enhancement was recovered in the first three months of operation, and the process continues to operate successfully.

BACKGROUND

The McKay Bay Refuse-to-Energy Facility, located in Tampa, Florida, is owned by the City of Tampa and operated by Wheelabrator McKay Bay, Inc. (WMBI). WMBI also served as the developer for the three-year retrofit project, completed in 2001, of this 1000-TPD facility. Facility operations were ongoing over the duration of the retrofit project, the major portion of which involved the replacement of all four combustion trains. [1,2] The existing turbine generator, a 22.5 MW General Electric unit, was kept in place.

Contract specifications required that each boiler have a maximum continuous rating (MCR) of 62,186 lb/hr. With all four boilers in operation, the total steam flow would be 248,744 lb/hr. The turbine, at maximum output, would operate at about 93% capacity, 220,000 lb/hr average, with all four boilers on line. Running the boilers below MCR allowed for load swings without affecting steam header pressure to the turbine. Excess steam, over 26,000 lb/hr, was sent to an existing bypass (dump) condenser. This bypassed steam represented energy not being realized, as well as affecting the net kwh/ton of processed MSW. We decided to investigate the possibility of enhancing the operation of the facility, and the generation of energy and revenue, by minimizing and at times eliminating bypassed steam.

SYSTEM DEVELOPMENT

At the time of the facility retrofit, normal maintenance schedules were kept in place for the turbine generator. During an outage, we investigated an upgrade of the mechanical hydraulic control (MHC) governing system to an electro-hydraulic control (EHC) digital governor. A new Woodward 505 governor control (Fig. 1) was installed by the facility's turbine contractor, Turbine Diagnostic Services, Inc. (TDS). When the turbine was brought back on line, it was immediately noted that the steam flow to the turbine was more stable with regard to the high and low points during a boiler load swing. However, steam still had to be bypassed to the dump condenser to maintain MCR set points when all four boilers were on line.

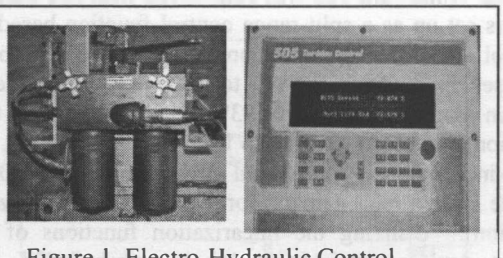

Figure 1. Electro-Hydraulic Control Governor and Computer Control Panel

We then decided to investigate the capability of controlling a second valve from the Woodward 505 governor in a split-range configuration. The key question was whether the operation of a second valve, an automatic control valve working from the second digital controller on the 505, would