

RESOURCE RECOVERY WASTE HEAT BOILER UPGRADE

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ABSTRACT

The waste heat boilers installed in a 360 TPD waste to energy plant were identified as the bottle neck for an effort to increase plant capacity. These boilers were successfully modified to accommodate the increase of plant capacity to 408 TPD, improve steam cycle performance and reduce boiler tube failures. The project demonstrated how engineering and operation can work together to identify problems and develop solutions that satisfy engineering, operation, and financial objectives.

Major issues of interest to the industry are:

(1) Heat maldistribution through the boiler may result in boiler superheater malperformance, and accelerated slagging and corrosion of superheater tubes.

(2) Confirm the experience of other refuse to energy type plants that the upgrade of SH tubes from T22 to Incoloy 825 Material increases life expectancy. At Springfield Resource Recovery Inc. (SRRI) the original T22 tubes were in service for 5 years. It is projected that the new Incoloy 825 material will be in service 10 years or longer.

(3) The original water cooled SH support tubes located in the gas stream were removed and replaced with "hot" SH support tubes located outside of the gas stream. It is estimated that the new support system increased effective heat transfer surface by as much as 12%, and the free flue gas flow area by approximately 8%.

(4) Confirm the advantages of using rotary "air puff" type sootblowers over steam type sootblowers for relatively small power plant. The air consumption of the "air puff" sootblowers

is distributed over long period of operation, and avoids the power output fluctuation that could have resulted using steam sootblowing. With the incoming flue gas temperature maintained at 1300 F, rotary "air puff" type sootblowers can be used throughout the boiler. Upgrade of the compressed air system at SRRI keeps the tubes clean and reduces the "on-line" and "off-line" water wash of these boilers to a minimum.

Plant checking and testing, design review and specification development, installation and operation results are presented.

INTRODUCTION

Plant upgrade at the Springfield Resource Recovery facility was carried out in order to increase the unit rated throughput capacity for municipal solid waste (MSW) from 120 tons/day (TPD) to 136 TPD. This unit capacity increase corresponded to an increase of waste heat boiler superheated steam production from 28,600 lb/hr to 32,200 lb/hr per boiler. In conjunction with this effort, specific design modifications were implemented in order to improve and correct operating problems associated with the plant's three waste heat boilers as originally installed. The focus of this discussion is to describe the modifications implemented and the results achieved for the steam generators and associated auxiliaries as the charging, incineration and flue gas cleaning equipment were already capable of increased capacity.

DESCRIPTION OF THE ORIGINAL WASTE HEAT BOILERS

The three waste heat boilers, located downstream of the ash transfer ram hearth type incinerators, are 'A' type designs each rated for 28,600 lb/hr at 753°F and 650 psig. These units were shop fabricated and supplied by Deltak to a duty specification provided by Vicon (Vicon, at the time this project was developed, employed a waste incineration and heat recovery