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2nd Year Comparison of Superheater Metal Wastage Rates Utilizing Various Boiler Tube Alloys in a Waste-to-Energy Facility

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Abstract

The SEMASS Resource Recovery Facility (SEMASS) is a processed refuse fuel (PRF) waste-to-energy plant serving Southeastern Massachusetts. The plant consists of three 1000 ton per day boilers that generate steam at 765 F and 650 psig for use in a steam turbine/generator set.

Over the past several years there have been a series of plant improvements made in order to achieve compliance with the MACT emission standards. Unfortunately, metal wastage rates due to fire side corrosion of pressure containing components, have increased significantly during this same time period. In an attempt to reduce overall maintenance costs and unscheduled down time due to tube failures, a test of various alloy tube materials was undertaken in 2001 (see NAWTEC#10 paper -1021) in the primary superheater section of boiler #1.

The materials tested were SA213-T22 (original spec.), SA213-T22 -Heavy Wall , SA213-TP310H, SB-423 Incoloy 825, and Inconel 625 spiral weld overlay of SA213-T22 base material.

This paper will summarize the results of the second year of testing including wastage rate tables and annualized costs for the various tube materials.

BACKGROUND

The SEMASS Resource Recovery Facility (SEMASS) is a processed refuse fuel (PRF) waste-to-energy plant serving much of Southeastern Massachusetts, Cape Cod and the surrounding area. Using its PRF technology,
Energy Answers Corporation developed the project in the early 1980'-s. The first two units have been in operation since 1988 and the addition of a third unit was completed in 1993. SEMASS is owned by the SEMASS Partnership, a Massachusetts limited partnership, between American Ref-Fuel of SEMASS, L.P. (Ref-Fuel), and ArkMass, Inc.

Each of the three units at SEMASS is capable of processing a nominal 1000 tons per day of municipal solid waste (MSW). Two condensing steam turbines receive the steam from all three boilers and develop a combined 80 MW of net power.

BOILER DESCRIPTION

The boilers at SEMASS are Riley Stoker (Babcock Borsig Power) type VR, balanced draft, natural circulation units. The boilers incorporate a welded membrane waterwall construction, generating bank, and two-stage pendant type superheater. These boilers are top-supported, two-drum, single-gas pass units. The design has a maximum continuous rating of 270,000 PPH at 650 psig and 750 ° F superheater outlet conditions.

The boilers are fired on Refuse Derived Fuel (RDF) utilizing a Riley Stoker double Spreader Type Stoker (see Fig #1). The boiler can also fire No. 2 fuel oil through two John Zink, Inc. round burners mounted on the rear wall at the 131'-0" elevation