

NAWTEC13-3143

NAWTEC 13 Speaker Abstract
**Corrosion Study and Modification of
Superheater Tubes in a Large Mass Burn WTE Boiler**

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Essex County Resource Recovery Facility (one of American Ref-Fuel Company's six operating plants) has processing MSW capacity of approximately 2700 TPD and about 60% of this waste comes from NY City. Therefore, availability of the Essex plant boilers is very important not only for the company's financial performance, it is also critical for the overall garbage disposal situation in the NYC Metropolitan area. One of the main factors affecting plant availability is boiler unscheduled downtime. The most recent data show that approximately 85% of Essex boilers unscheduled downtime is caused by tube failures, the majority of which occur in the superheater tubes. These tube failures are almost exclusively caused by fireside tube metal wastage driven by complicated mechanisms of corrosion in combination with local erosion. The corrosion is caused by chloride salts in the slag that deposits on the boiler tubes, coupled with high temperatures of flue gas going through the boiler. Corrosion rates are known to be very sensitive to flue gas temperature, tube metal temperature, heat flux, flow distribution. Erosion is typically caused by high velocities and flyash particle loading and trajectories. Extensive research revealed that in addition to this typical to WTE boiler corrosion/erosion mechanism, Essex boiler superheater tubes experienced a unique problem, resulting in tube overheating, accelerated wastage, and ultimate failure. In order to address this problem a modification plan was developed, which comprised several redesign options. A specially developed Three-dimensional Computational Fluid Dynamics (3-D CFD) model was utilized for comprehensive technical evaluation of the considered design options and for predicted performance simulations of the selected design at different operating conditions. The economical analysis, conducted in conjunction with the superheater redesign, provided financial justification for this project. The project has been recently executed, and field data collection is still in progress. Some preliminary data analyses have been performed. They have shown that the boiler performance after superheater modification is very close to the predicted target simulated by the CFD model. The plant and the company are already measuring financial benefits as a result of this project, the initial phase of which is presented in this paper.

Greg Epelbaum works for American Ref-Fuel as a Chief Engineer. As part of Central Process Engineering he provides ongoing technical support to six ARC WTE plants, mostly in the boiler area. Mr. Epelbaum leads the development of new engineering tools, new projects, and new technology applications. Mr. Epelbaum started his career in the former Soviet Union in the National Power Plant Construction Company, where he was engaged in construction, commissioning and start-up of utility power plants. Prior to American Ref-Fuel, Mr. Epelbaum worked for Foster Wheeler Energy Corporation. Mr. Epelbaum received his BS in Mechanical Engineering and MS in Steam Generator Technology from Kiev Polytechnic Institute.