

## Morningstar TODD® Ultra Low Emissions Burner Installation

### The Situation

In late November 1994, a TODD Combustion® Dual Rapid Mix Burner (D-RMB) was retrofitted into a 100,000 lb/hr Nebraska boiler at the Morningstar Cannery in Los Banos, CA. The D-RMB replaced a forced Flue Gas Recirculation (FGR) burner permitted for 30 ppm NOx and 400 ppm CO. The TODD retrofit consisted of replacing the existing burner and fan, while most of the existing control system components were reused. The objective of the project was to demonstrate the ability of the D-RMB version of the burner to operate at less than 9 ppm NOx and CO across the load range. Since the NOx emissions of the D-RMB are relatively insensitive to the heat release rate of the boiler, the burner was designed for an increased capacity.

### The Boiler

A natural gas only, 130 MMBtu/hr D-RMB was installed on a Nebraska 100,000 lb/hr watertube boiler equipped with an economizer. The burner installation consisted of the D-RMB and a forced-draft combustion air fan sized for induced FGR. The existing cross-



Fig. 1

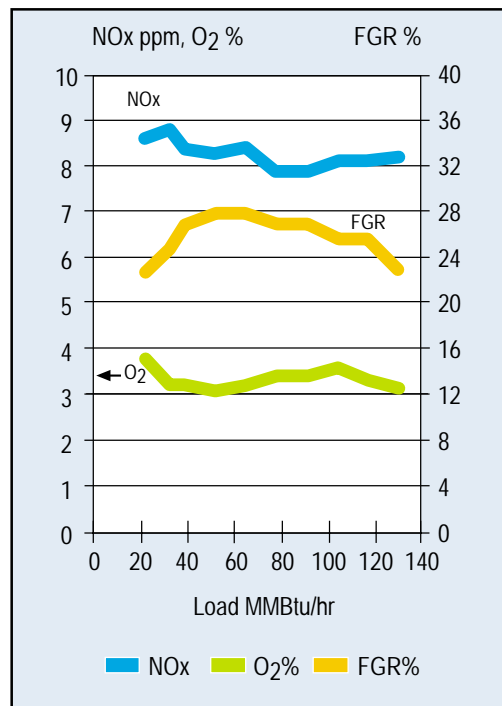


Fig. 2: Morningstar Data

limited metering control system and gas train were both reused. The burner operates at an 8-in. draft loss and 5 psig gas pressure at full load. Since the performance of the D-RMB is relatively insensitive to the heat release rate of

the boiler, a 130 MMBtu/hr D-RMB was used to replace the existing burner that had a 118 MMBtu/hr capacity. The larger burner increased the boiler capacity from 100,000 lb/hr to 110,000 lb/hr.

### The TODD® Result

Fig. 2 illustrates the test results achieved with the boiler in automatic operation. The FGR rate varied from 28% in the lower half of the load range to 23% at full load. NOx emissions varied between 8 ppm and 9 ppm. Over the load range, the CO was less than 1 ppm. Excess O<sub>2</sub> levels ranged from 4% at minimum load to 3% at full load. The burner turndown was 6:1 and the flame length was less than 10 feet over the load range.

### Third Party Source Test

On December 14, 1994, the boiler was source-tested by Best Environmental. The results are shown below. The CO and NOx numbers are corrected to 3% O<sub>2</sub>.

### Source Test Data

Load %	O <sub>2</sub> %	CO ppm	NOx ppm
25	3.4	<1	8.1
50	3.4	<1	8.2
100	3.2	<1	8.3

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