

RETROFIT EXISTING BOILERS TO MEET LOW NOX EMISSIONS REQUIREMENTS

BOILER DIVISION CASE STUDY

J.G. Boswell Tomato Company

Buttonwillow, California

Boiler Retrofit

CUSTOMER APPLICATION AND KEY CHALLENGES

Two Cleaver Brooks Industrial Watertube boilers are responsible for plant operations that include processing approximately 4,800 tons/day of fresh tomatoes with a 240,000 pph peak steam demand at 350 psig saturated conditions. The boilers were originally supplied in the year 2000 with burners designed to meet the then current San Joaquin Unified Air Pollution Control District Rule 4306 requiring units over 20 mmbtu/hr to operate at less than 9 ppm NO_x. In 2007, the Air District began workshops with the intent to further limit NO_x emissions. With this new rule pending, J.G. Boswell approached R.F. MacDonald Co requesting a solution that would allow the boilers to operate below the new limits of 6 ppm NO_x and 50 ppm CO and to review energy saving options related to this upgrade.



Field service technician commissioning the new burner/scr system

THE R.F. MACDONALD CO ANALYSIS & SOLUTION

The project required the supply and installation of a burner retrofit package designed to operate at less than 6 ppm NO_x and improve overall system efficiency. The solution proposed included replacing the existing Todd Combustion RMB Ultra Low NO_x burners with Cleaver Brooks/Natcom standard emission burners and an SCR emission control system.

The use of standard emissions burners with minimal Flue Gas Recirculation reduced the combustion air blower motor horsepower requirement from 450hp to approximately 300hp. In addition to the reduction in motor horsepower, variable frequency drives were added to the blower fan motors, further improving operating efficiency. Additional energy savings was predicted as the new system design allowed for the excess

stack oxygen level to be reduced from an average of 5% to 3%. As a final benefit, the proposed standard emission burners with the use of minimal Flue Gas Recirculation will allow for improved operational stability and increased turndown.



Final performance and emission testing of the new system

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Installation of the new SCR and flue stack

PROJECT RESULTS

The new burner/SCR system was installed and commissioned prior to the 2008 tomato season. Start-up services, load testing, source testing, operator training and AMS certification was conducted by R.F. MacDonald Co factory authorized technicians. The units were compliance tested with results that exceeded design expectations.

J.G. Boswell was able to submit for a utility incentive in excess of \$95,000, as well as an additional incentive of a 1% reduction in natural gas consumption, which resulted in savings of approximately \$50,000 annually.

The NO_x emissions were measured at an average of less than 5 ppm with the CO emissions measured at less than 4 ppm and both boilers source tested at less than 2ppm NO_x and 1ppm NH₃ slip. In addition to the successful emissions testing, J.G. Boswell was able to submit for a utility incentive in excess of \$95,000 for the VFD & blower motor horsepower savings as well as an additional incentive for a 1% reduction in natural gas consumption due to the lower excess stack oxygen levels which resulted in savings of approximately \$50,000 annually. In addition to the one time utility incentives received, the facility will benefit from these efficiency improvements with the resultant annual energy savings. The system has improved the overall operation, reduced downtime associated with burner stability and limited turndown, and operates well within the mandated emissions requirements.