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 opera-
tions that include processing approxi-
mately 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 oper-
ate at less than 9 ppm NOx. In 2007, the
Air District began workshops with the
intent to further limit NOx emissions.
With this new rule pending, J.G. Boswell
approached R.F. MacDonald Co request-
ing a solution that would allow the boil-
ers to operate below the new limits of 6
ppm NOx and 50 ppm CO and to review
energy saving options related to this
upgrade.

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 NOx
and improve overall system efficiency. The solution proposed
included replacing the existing Todd Combustion RMB Ultra
Low NOx burners with Cleaver Brooks/Natcom standard emis-
sion 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 fre-
quency 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.
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.

Installation of the new SCR and flue stack

The NOx 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 NOx 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.

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