



# EcoCAT

EMISSIONS REDUCTION SYSTEM

Patent No. US 10,844,763 B2 | Designed and Manufactured by



**R.F. MacDonald Co.**

hydronic, steam & pumping solutions

## EcoCAT™ Selective Catalytic Reduction (SCR)

SAFELY AND EFFICIENTLY REDUCE NO<sub>x</sub>  
NO<sub>x</sub> REDUCTION IN EXCESS OF 95%, DOWN TO 2.5 PPM






# EcoCAT's™ Patented Technology Utilizes the Safest, High Performance NOx & CO Reduction SCR Technology for Industrial Applications

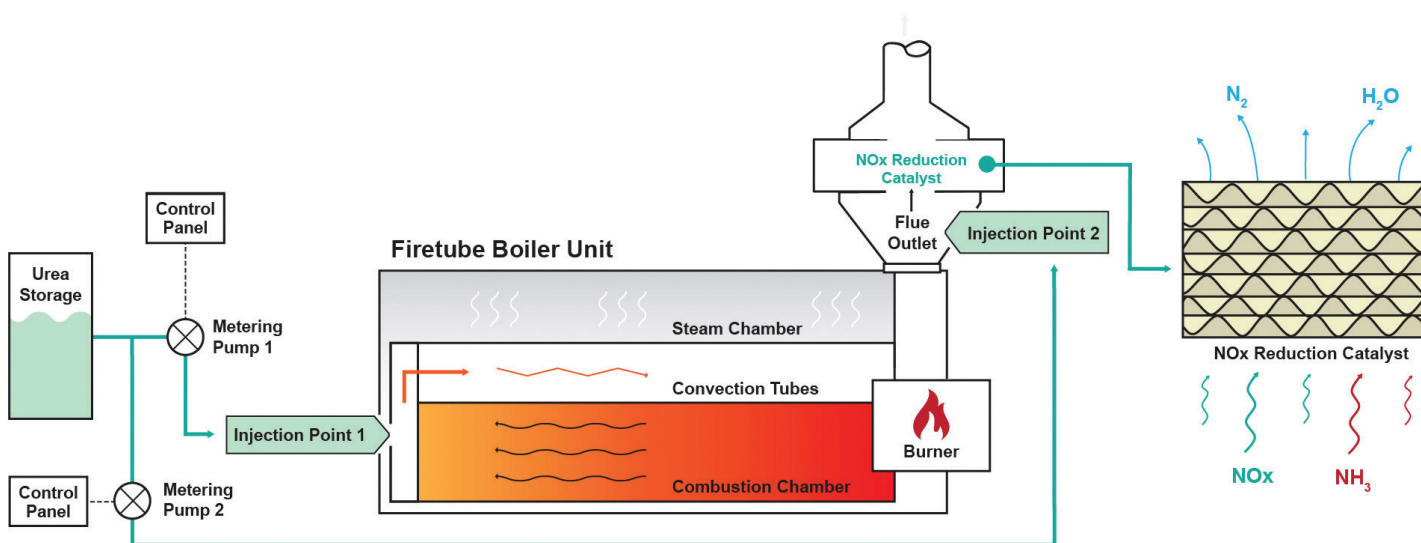
**Reduce NOx in a flue gas stream in excess of 95%, down to 2.5% ppm**

Selective Catalytic Reduction (SCR) is a post-flue gas treatment that is capable of reducing NOx emissions from a wide variety of boiler systems. SCR is one of the most effective ways of reducing NOx in a flue gas stream with reductions in excess of 95%!

- The industry's only totally integrated systems
- Ammonia transforms NOx into harmless nitrogen
- Flow modeling used to optimize every system
- Applications for any fuel-fired equipment

EcoCAT SCR technology continues to be the most effective method of NOx reduction, as it does not sacrifice boiler performance, unlike other NOx reduction technologies.

NOx Reagents (Ammonia Sources)	 <b>PURE ANHYDROUS</b>	 <b>AQUEOUS</b>	 <b>UREA</b>
Hazard Rating (Level of toxicity): 3 = Extreme 2 = Moderate 1 = Low	<b>3</b>	<b>2</b>	<b>1</b>
Level of Usage Risk Compared:	<b>Highest Risk</b>	<b>Moderate Risk</b>	<b>Low Risk</b>
Ease of Use / Operation Readiness:	Ready to operate	Vaporized before use	Needs vaporization & Conversion
Safety Requirements:	Training, Emergency Planning Fire Dept Audit	Training, Emergency Planning Fire Dept Audit	Onsite Training
Most Common Applications:	Power Plants, Industrial Facilities	Agriculture, Food Processing, Utilities	Hospitals, Schools, Universities and Prisons



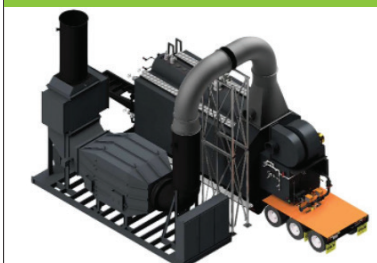


## Total Engineering Support

The RFMCO team is dedicated to providing you an engineered solution to ensure emissions compliance while also maximizing your system performance, safety, and sustainability.

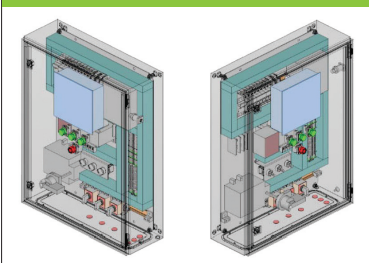
Over the years, we have helped many customers achieve and maintain single-digit NOx levels with a wide array of technologies, products, and unique solutions for individual applications.

### Mechanical



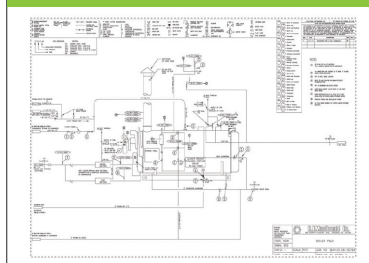
We have highly experienced draftsmen to produce AutoCAD and Solid Works drawings.

### Electrical



We provide both hardwired and computer-based systems for supervisory control.

### Submittals and O&Ms



Complete submittal package including mechanical, electrical, seismic, final As-Built documentation with O&M manuals.

## CASE STUDY: Direct Urea Injection with SCR Technology

**Customer:** Loma Linda University Health | Loma Linda, CA

**Application** Loma Linda University's main campus hospitals require hot water for use throughout the building and steam for sanitation, humidification and clean steam production.

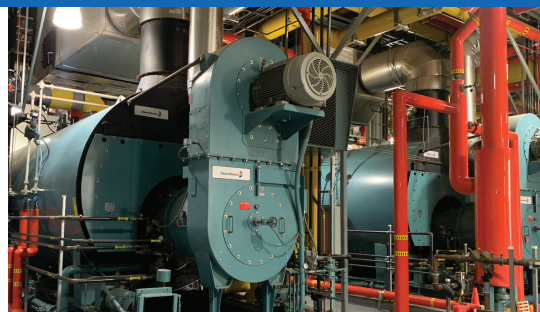
**Key Challenges** As part of the Loma Linda University Campus Transformation project, two new hospital towers were added. The additional facilities required additional steam, which was provided by higher-capacity boilers. R.F. MacDonald Co. was selected for this project by providing total integration services, including:

- Engineering and installation support
- Supplying the boilers with our newly patented Direct Urea Injection with SCR technology to meet emissions regulations
- Complete startup and testing services

**Solution** R.F. MacDonald Co. supplied three Cleaver-Brooks CBEX Elite 1,400HP firetube steam boilers. Each boiler can produce up to 48,300 pounds of saturated steam per hour. Our newly patented Direct Urea Injection with Selective Catalytic Reduction technology was installed. At approximately 58 MMBtu/hr, the larger boilers are required to meet sub 5 PPM Low NOx regulations set by the South Coast Air Quality Management District.

**Results** Cleaver-Brooks Profire XL Burner with Direct Urea Injection SCR

- Eliminates the hazards of storing anhydrous or aqueous ammonia
- Achieves a 10:1 turndown ratio
- Achieves sub 5 PPM NOx emissions
- Achieves sub 5 PPM ammonia slip
- Reduces ammonia vaporizer costs
- Reduces electrical load costs
- Reduces footprint



SCR with Non-Hazardous Urea

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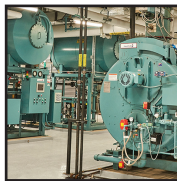
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### RENTAL

In addition to new SCR equipment sales, we can provide rental equipment for your existing system.



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