



# SCR LOW NOx SOLUTIONS & SUPPORT



**R.F. MacDonald Co.**

*your boiler & pump solutions team*




*~ since 1956*



## Your Premier Supplier of Ultra-Low NOx Systems, Parts, Service, & Support

R.F. MacDonald Co. (RFMCO) has positioned itself to be a low NOx solutions expert since the ARB and local California Air Quality Management Districts (AQMD) began mandating stringent emissions standards in 1983. RFMCO has utilized various methods including retrofitting existing units with flue gas recirculation, ultra-low NOx burners, controls solutions, and Selective Catalytic Reduction.

Selective Catalytic Reduction (SCR) technology continues to be the most effective method of NOx reduction, as it does not sacrifice boiler performance, unlike other NOx reduction technologies. There are three methods to reduce NOx with SCR and these include using anhydrous ammonia, aqueous ammonia, or urea. Urea, particularly, is a valuable method to implement in **institutions** like hospitals, schools, universities, prisons, and other buildings that house large civilian populations routinely. This is because direct urea injection in boilers is an inexpensive strategy with the lowest hazard rating, making it the safest option available to reduce emissions levels.

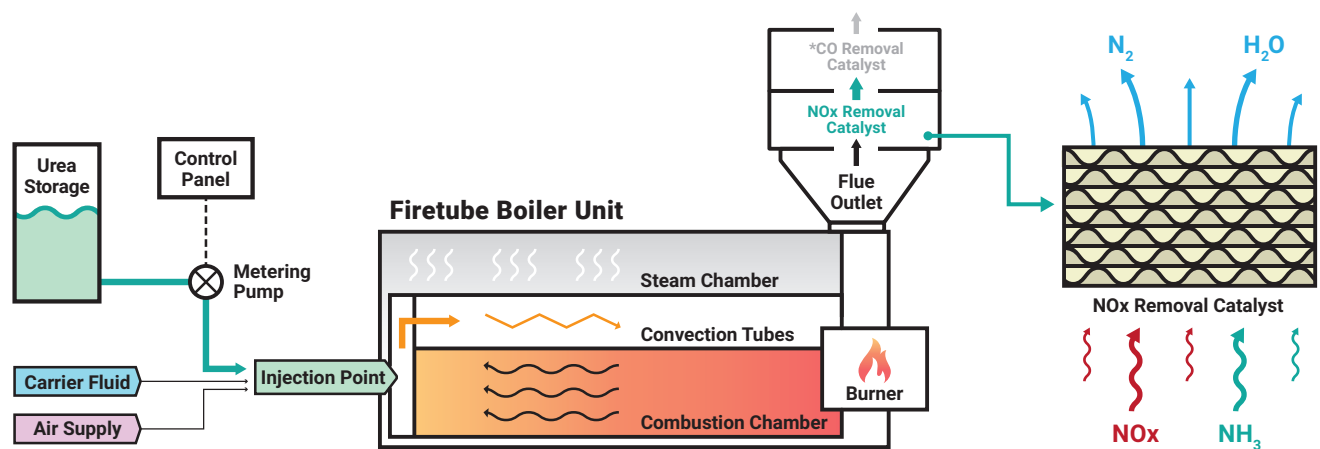
NOx Reagents (Ammonia Sources)	 PURE ANHYDROUS	 AQUEOUS	 UREA
Hazard Rating (Level of toxicity): 3 = Extreme 2 = Moderate 1 = Low	<b>3</b>	<b>2</b>	<b>1</b>
Level of Usage Risk Compared:	<b>Highest Risk</b>	<b>Moderate Risk</b>	<b>Low Risk</b>
Ease of use / Operation Readiness:	Ready to Operate	Vaporized before use	Needs vaporization & conversion
Compliance Requirements:	See AQMD & APCD Chart Below for Requirements		
Safety Requirements:	Training, Emergency Planning, Fire Dept. Audit	Training, Emergency Planning, Fire Dept. Audit	On-Site Training
Most Common Applications:	Power Plants, Industrial Facilities	Agriculture, Food, Processing, Utilities	Hospitals, Schools, Universities & Prisons
R.F. MacDonald Co. Offers:	Full Installation Support & Service		

### AQMD & APCD Chart (By District) Updated Jan. 2020

Bay Area Air Quality Management:	5-9 PPM NOx (over 20MMbtu input)
Sacramento Metropolitan Air Quality Management:	Varies (Consult the Air District)
San Joaquin Valley Air Pollution Control: *	2.5 PPM NOx (over 20MMbtu input) 3.5 PPM NOx (under 20 MMbtu input)
Southern California Air Quality Management:	5 PPM NOx (over 20 MMbtu input) 7-9 PPM NOx (under 20 MMbtu input)
San Diego Air Pollution Control: *	9 PPM NOx (over 20MMbtu input)

\* = Monitored by Best Available Control Technology





The Selective Catalytic Reduction (SCR) process when incorporating Urea injection as a reductant, safely reducing NOx levels

*\* CO Removal Catalyst is an optional catalyst stack to further reduce emissions*

## Our Experience and Qualifications

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.

In addition to meeting low emissions, businesses are focused on reducing costs and maximizing efficiency of their operation. R.F. MacDonald Co. is experienced in applying a number of solutions to satisfy this strategy. Together we can reach your goal.

### Engineering Services

- Cold Flow Modeling (CFM) or Computational Fluid Dynamics (CFD)
- 3D Laser Scanning of boiler room/job site
- 3D Modeling Design
  - Integration with 3D scans
- Custom ammonia flow control unit, ammonia injection grid, and catalyst reactor housing
- Custom Controls Integration
- Emissions Control for various fuels

### Turbine Applications

- Co-generation or simple cycle
- Deliver reliable < 2.5 PPM NOx performance
  - for gas turbine applications starting at 2.5 MW

### Industrial Watertube Boiler Applications

- SCR for any size and configuration
  - e.g. A-Type, D-Type, etc.
- Vertical or horizontal orientations
- New or retrofit applications
- Optimize boiler performance

### Firetube Boiler Applications

- Integrate structural support within boiler
- Top or horizontal flow design available to meet boiler room constraints
- Provide reliable NOx performance in a variety of sizes

### CORPORATE

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### CONTRACTOR LICENSE

CA: #220117  
NV: #0042816

## YOUR SINGLE SOURCE PARTNER



### CENTRALIZED PUMP REPAIR SHOP

- 5,000 sq. feet of crane coverage
- Cranes with a 10-ton lifting capacity
- All major types of repair equipment
- Comprehensive pump inspection checklist



### PUMPS AND SYSTEMS

- Designed for optimum performance
- Complete range of commercial pumps
- Ideal for HVAC and commercial applications
- i-Alert 2 Performance Monitoring



### SERVICES AND RENTALS

- Rental equipment and mobile boiler rooms
- Full aftermarket services and parts support
- Instrumentation and controls
- Full Equipment Startup



### BOILER AND PUMP TRAINING

- AFE Certified
- CWEA Certified
- Visit [rfmacdonald.com/training](http://rfmacdonald.com/training)



### MORE INFORMATION ONLINE