

# DEALING WITH THE NEW BOILER EMISSION REGULATIONS

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# Goals for Today

Review SJVUAPCD rule 4320

Compliance Options for NEW equipment

Compliance Options for EXISTING equipment

Introduction to -Selective Catalytic Reduction

San Joaquin Valley APCD Rule 4320  
Units 5 MM Btu/hr to 20 MMBtu/hr

Standard Schedule – 9 ppm or 0.011 lb/MMBtu

ATC filed by July 1, 2011

Compliance by July 1, 2012

Enhanced Schedule – 6 ppm or 0.007 lb/MMBtu

ATC filed by January 1, 2013

Compliance by January 1, 2014

# San Joaquin Valley APCD Rule 4320 Units 20 MMBtu/hr & Above

Standard Schedule – 7 ppm or 0.008 lb/MMBtu

ATC filed by July 1, 2009

Compliance by July 1, 2010

Enhanced Schedule – 5 ppm or 0.0062 lb/MMBtu

ATC filed by January 1, 2013

Compliance by January 1, 2014

# THE TARGET IS 5PPM NO<sub>x</sub>

What are your options?

File for Low Use

Pay Annual Fee

New Equipment

Retrofit Equipment

# San Joaquin Valley APCD Rule 4320

## File for Low Use

ATC filed by January 1, 2013

Compliance by January 1, 2014

1.8 Billion Btu per year (72 hours @ 25 MMBtu/hr)

Demonstrate 3% O<sub>2</sub> or tune twice per year

New requirements will apply to current “Low Use” permits

# San Joaquin Valley APCD Rule 4320

## Pay Annual Fee

Based on total emissions generated

\$9,350 per Ton of NO<sub>x</sub> (District Rule 9510)

4% administration fee

# COMPLIANCE FOR NEW BOILERS

## NEW GENERATION OF TECHNOLOGY

Ultra Low NO<sub>x</sub> Burner/Boiler  
(700HP or <28MMBtu/hr)

SCR (>28 MMBtu/hr)

Best Performance Standards (BPS)

Stand by –

SJVUAPCD has currently suspended its policy

GOOD NEWS! Incentive funding is available



# Firetube Example

- 700 hp Firetube
- 24.15 MM Btu/hr Input
- 5ppm NO<sub>x</sub> (New Technology in Boilers)
- Fully Condensing Economizer 247 deg F EGT
- FD Fan VFD & O<sub>2</sub> Trim
- Auto-Blowdown Control & Heat Recovery
- Passed source test





# COMPLIANCE FOR EXISTING EQUIPMENT

- INTRODUCTION TO (SCR)

In the Selective Catalytic Reduction process, a catalyst facilitates a chemical reaction between NO<sub>x</sub> and Ammonia (NH<sub>3</sub>) in the presence of Oxygen (O<sub>2</sub>) to produce Nitrogen gas (N<sub>2</sub>) and water vapor (H<sub>2</sub>O)

# San Joaquin Valley APCD Rule 4320

Retrofit Equipment to 5 ppm NO<sub>x</sub> with SCR

BENEFITS -

Convert to High Efficiency 30 ppm burner

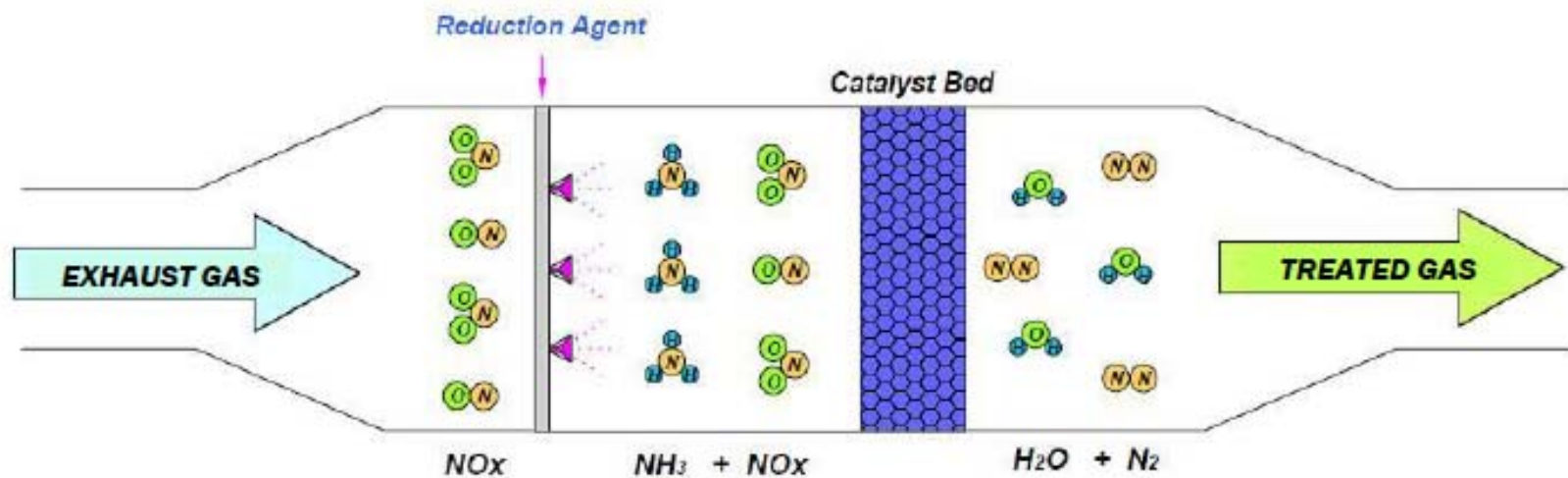
Reduced FGR

Reduce excess air

Increased Capacity/Output

Simplification of control strategy

# De-NOx Principle



# Chemical Reaction

- $4\text{NO} + 4\text{NH}_3 + \text{O}_2 = 4\text{N}_2 + 6\text{H}_2\text{O}$  (>90%)
- $2\text{NO}_2 + 4\text{NH}_3 + \text{O}_2 = 3\text{N}_2 + 6\text{H}_2\text{O}$
- $\text{NO} + \text{NO}_2 + 2\text{NH}_3 = 2\text{N}_2 + 3\text{H}_2\text{O}$

# SCR System

Ammonia Flow Control Unit (AFCU)

Ammonia Injection Grid (AIG)

Reactor Housing

Catalyst



# SCR System



# SCR System



# Catalyst

## DNX Type

- Corrugated style
- Buy in modules
- Engineered catalyst sizing
- Boiler Exhaust Temp
- Inlet Nox/Outlet NOx



# Ammonia Systems

- Anhydrous Ammonia
- Aqueous Ammonia
- Urea to Ammonia

# Anhydrous Ammonia

- Least expensive installation
- Three 150# cylinders
- Classified as 'toxic' – careful storage and handling
- Dilution air blower transports  $\text{NH}_3$  to AIG
- Flow metering is Critical

# Aqueous Ammonia

- Ammonia stored in water (19%)
- 2,000 gallon tank w/foundation containment
- Vaporizer Required (Electric is most common)
- Classified as 'toxic' – careful storage and handling
- Dilution air blower transports NH<sub>3</sub> to AIG

# Urea

- Most expensive
- Large tank system required
- AFCU to convert Urea to ammonia
- Temperature dependent to keep in solution
- Classified as 'non-hazardous'
- Dilution air blower transports NH<sub>3</sub> to AIG
- Industry is trending more toward urea

# Frequently Asked Questions

- Cost of SCR vs. New Boiler/Burner
- Complexity of SCR vs. New Boiler/Burner
- Space Requirements
- Operational cost impacts



Questions?