Ammonia Injection
CALCINER AND KILN DUCT RISER
Orientation Session
Contents

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Introduction and Purpose

- To reduce the amount of Nitrogen Oxides emitted into the air. (NOx)
- NOx are a major source of atmospheric pollution
- Control methods involve combustion and post combustion operating practices
- Selective Non-catalytic Reduction (SNCR)
- Selective Catalytic Reduction (SCR)
Why 19% Ammonia

- Ammonia contains Nitrogen and hydrogen (NH$_3$).
- Is absorbed in the gas/material stream and forms other non harmful compounds.
- Has been proven to be an effective and inexpensive SNCR method of control NOx emissions.
- Most effective is in the kiln riser duct.
Why 19% ammonia

- Ammonia solution is 19% by volume, the remainder 81% is water.
- Also called Ammonium Hydroxide, Aqueous solution, Ammonia Water, Pony p..s.
- The solution remains toxic to a certain degree – caution when handling
- Familiarization with MSDS
Injection Equipment

- Injection lances
- Atomizing air and flow control cabinet
- Piping system for air and ammonia solution
- Pumping station
- Storage tank
Lances

- High temperature material - 316 stainless
- Require constant air flow for cooling
- Should last 8-10 months of operation.
- Nozzles are easily replaced
- 2.7 lt/min @ 45-70 psi
- 4.5 mm orifice, 35-40 micron droplets
- Air 13.25 scfm @ 70-80 psi
Lance design

1. COMP. AIR "IN" 3/8 NPT
2. Air tube
3. Orifice Valve
4. Carbon Seal
5. Ammonia tube
6. Nozzle tip
7. 10 1/4
8. 13 1/8
9. 8 1/2
Riser duct lance installation El 116-6” ft

Lance controls
Air header 1”
Ammonia header 3/4”
Atomizing control cabinet

Control valve

Blue – air

Green – ammonia

Flow transmitter
Pump skid

Pressure switch

Pressure Regulating Valve

DP Across Strainers

Pump discharge pressure
Containment overflow Valve
Truck Loading Station

Indicating lights

Tank Level Indicator and fill
Valve open/close
Process Flow diagram description

- Storage tank
- Pump skid
- Atomizing Control Cabinet
- Lances and controls
Commissioning

- Hydrostatic test
- Water test – simulate the process using water
- Fine tuning adjustments
- Electrical – grounding
- Motor rotation verified – connect pump
- Analog and digital signals verified - red/green lights, level display
Commissioning

- Check lance nozzle if free of debris
- Verify flow rates
- Fine adjustment at each lance
- Balance air/solution
- Ready to start up
Start Up

- Water was drained?
- Tank filled with ammonia?
- Containment space cleaned and cleared!
- Start the pump – it will take some time to reach the control cabinet
- The effect of ammonia injection will take a few minutes to show results.
- Follow gas analyzer output
Material safety data sheet

- Ammonia Supplier
- MSDS attached – read
- Avoid Inhalation, skin contact, eye contact
- Fresh air
- Use lots of water on the affected area
- Spill – stop leak, dilute with lots of water
- Fertilizer, household cleaning, pharmaceutical, lubricants
Questions?

Thank you