

**WAHLCO, Inc.**

**Urea to Ammonia Systems  
Safety and Economics  
McIlivaine Topic Hour**

Chinese SCR Program  
April 21, 2011

# DeNOx Reagents

- SCR Technology
  - Ammonia generally used as reducing agent
  - Temperatures usually not conducive for direct urea injection
  - Feed stock choices are:
    - Anhydrous Ammonia
    - Aqueous Ammonia
    - Urea to Ammonia

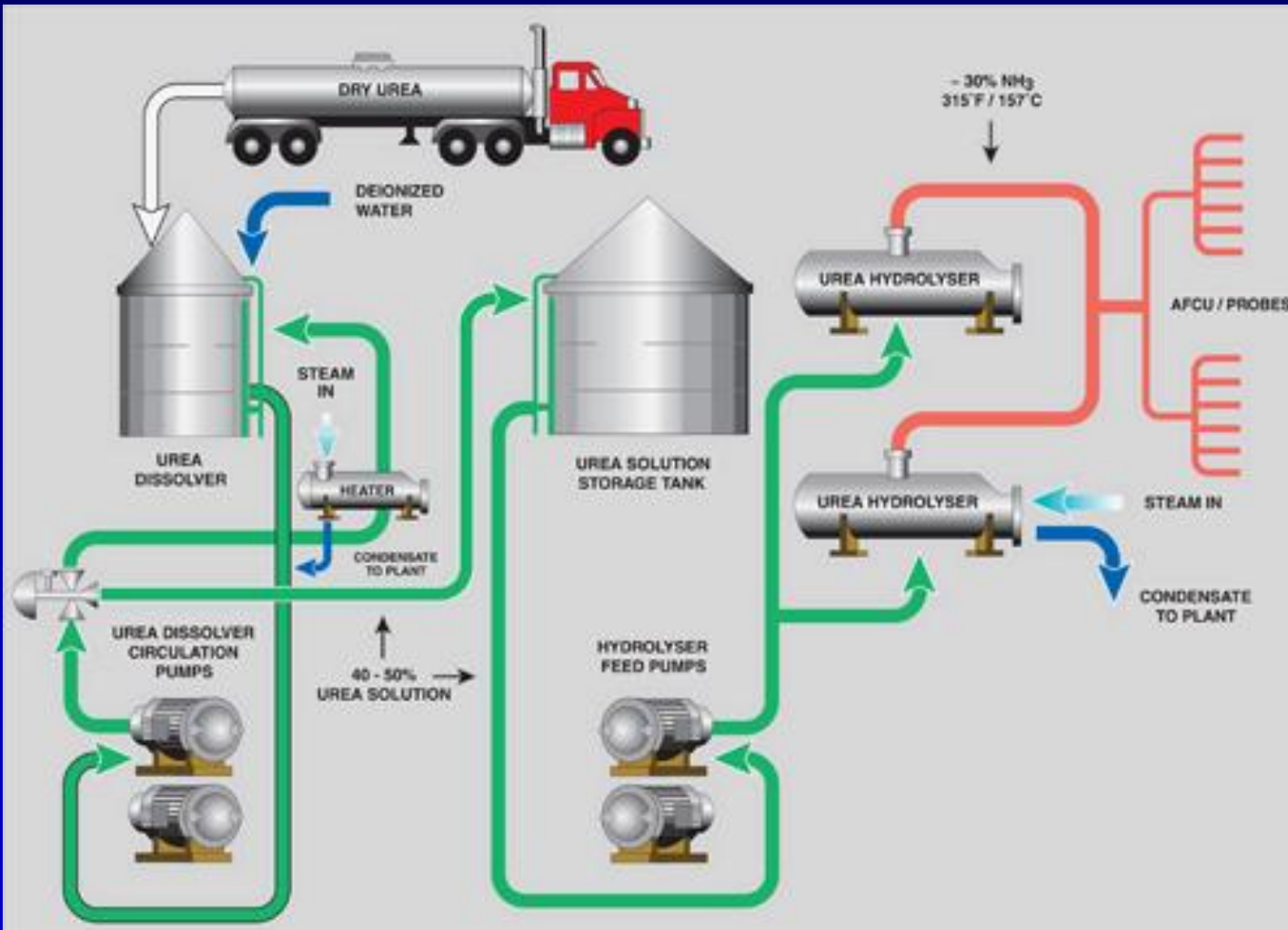
# Anhydrous NH3 Safety Issues

- Anhydrous Ammonia highly toxic lethal chemical
- Almost 10,000 accidental releases in ten years
- Storage entails high liability
- Regulated by Homeland Security
- Requires Coded Pressure Vessels
- Transportation costs rapidly increasing due to Liability issues – can not be trucked in many areas

# U<sub>2</sub>A<sup>®</sup> Technology

- Process Converts Urea to Ammonia on Site as needed
- No on site storage of Ammonia
- U<sub>2</sub>A<sup>®</sup> (urea to ammonia): Reduces risks associated with ammonia handling:
- (U.S. patents 6,077,491, 6,322,762, 6,436,359 and 6,506,350; European and Asian patents issued or pending)

# How does U<sub>2</sub>A<sup>®</sup> work?



**Dissolve Urea**  
(Urea + Water)



**Hydrolyze**  
Urea Solution



**Deliver**  
**Product Gas**  
(on-demand)



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# Process Description

- Urea Hydrolysis
  - 40 to 50% Urea Pumped to Reactor
  - Heated to about 300°F
  - Pressure of 40 to 120 psig
  - 40% Decomposes to:
    - 28.5%Vol. Ammonia Vapor
    - 14.3%Vol. Carbon Dioxide
    - 57.2%Vol. Water Vapor

# 500 lb/hr Hydrolyzer



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# Summary

- Urea to Ammonia Systems
  - Safe Alternative to Anhydrous Ammonia
  - Non Regulated Feed Stock
  - Less Uncertainty of Future Regulations