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
U₂A® Technology

• Process Converts Urea to Ammonia on Site as needed
• No on site storage of Ammonia
• U₂A® (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 U₂A® work?

Dissolve Urea (Urea + Water)

Hydrolyze Urea Solution

Deliver Product Gas (on-demand)
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
Summary

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