



3D TRASAR™ Technology for UAN Solutions

Unparalleled Corrosion Protection
and Quality Control

NALCO Water
An Ecolab Company

Integrated Approach to UAN Corrosion Management and Quality Control

Urea Ammonium Nitrate (UAN) is growing in popularity worldwide. Its use has several advantages to farmers. As a liquid, it is easy to spray evenly and can be used with controlled dosing systems. It can also be mixed with other micronutrients, herbicides and pesticides, affording a one-pass application.

The downside to UAN is that it is highly corrosive to storage tanks, pipes, rail cars, and agricultural application equipment. Left untreated, UAN corrosion can lead to the following detrimental impacts for producers:

- ▲ Unscheduled plant shutdowns
- ▲ Discoloration and sludge formation
- ▲ Damage to storage tanks and rail cars
- ▲ Increased maintenance and downtime costs
- ▲ Financial and environmental claims

Nalco Water has been manufacturing UAN corrosion inhibitors and servicing UAN producers worldwide for nearly 20 years. This experience, combined with world-class research and on-site technical service, has allowed Nalco Water to develop a fully integrated approach to UAN corrosion management and quality control.

3D TRASAR Technology represents a step change in asset protection and quality assurance by monitoring corrosion inhibitor concentration, pH, temperature, corrosion rates, and percent Nitrogen content in real time, 24/7/365.

Benefits:

- ▲ Instantaneously identifies parameters that are outside established limits for minimal corrosion rates and % Nitrogen content
- ▲ Catches problems not identified by periodic laboratory testing
- ▲ Helps UAN producers identify, correct, and solve the root cause
- ▲ Significantly improves UAN quality consistency and asset protection
- ▲ More tightly controls % Nitrogen content and increases profitability



3D TRASAR Technology Dashboard

- ▲ Provides instantaneous visibility across the enterprise
- ▲ Provides data logging, reporting, and alarming (email or text message)
- ▲ Features web-based access, available 24/7/365



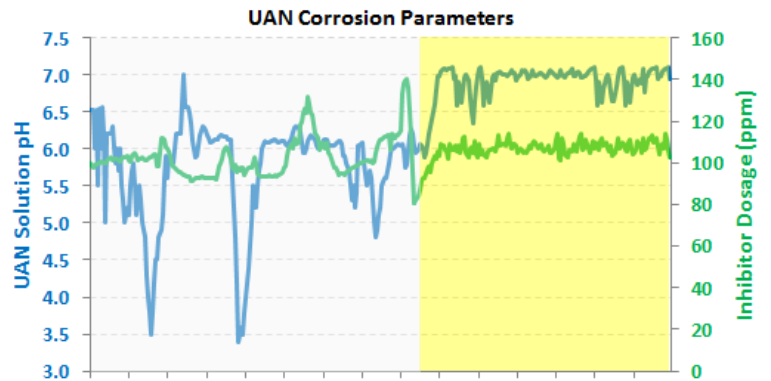
Enhanced corrosion control = Peace of mind

Before 3D TRASAR Technology

- Frequent acidic events
- Erratic inhibitor dosage

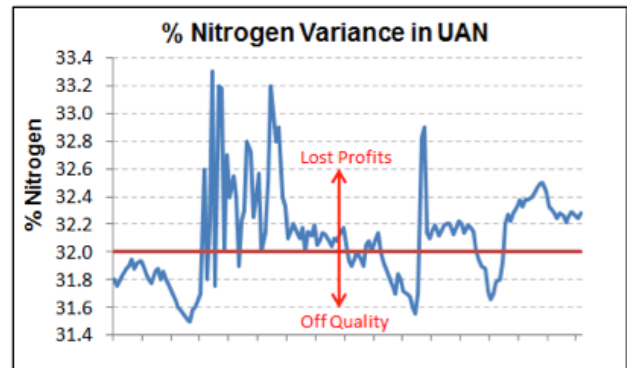
After 3D TRASAR Technology

- Fewer, less severe acidic events
- Consistent inhibitor dosage



Increased profitability

For UAN 32, two pounds of Nitrogen is "given away" for every 0.1% above the target of 32.0%. Accurate on-line %N monitoring in real time means process adjustments can be made on a more frequent basis, thereby reducing product costs and improving profitability.



3D TRASAR Technology for UAN Corrosion Management

Monitoring parameters on a periodic basis may not detect deviations that can significantly impact corrosion rates. To address this shortcoming, Nalco Water developed 3D TRASAR Technology for UAN corrosion management. It incorporates advanced software and specially designed monitoring devices to provide instantaneous identification of parameters that are outside established limits for minimal corrosion rates and communicates with plant operations via cell phone, pagers, and the web. The result is a proactive approach to identifying and correcting upstream problems that could compromise asset protection and UAN product quality.

3D TRASAR Technology provides new insight into UAN process dynamics and their effect on corrosion rates. As an example, two pH excursions with corresponding high corrosion rates were identified (as shown in Figure 1). In the first excursion, after receiving the alarm, operators found a faulty nitric acid valve resulting in slugs of acidic UAN. In this instance, the valve was repaired and the pH swings in mix tank were ultimately buffered in the bulk

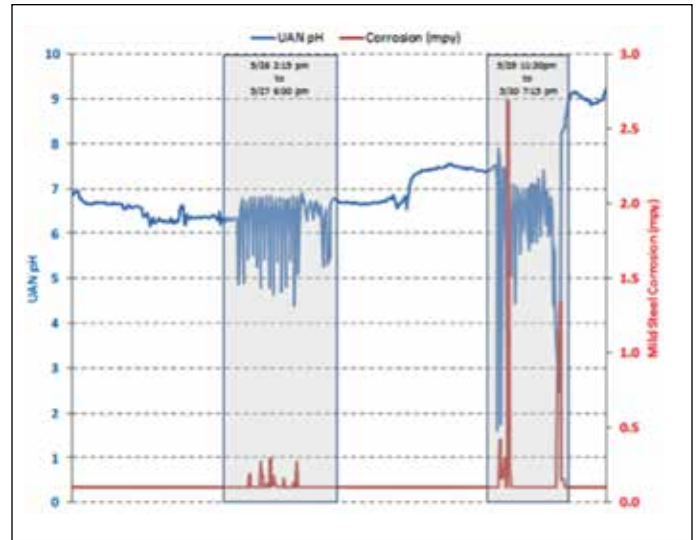


Figure 1 - 3D TRASAR Technology for UAN Monitoring

storage tank. The second excursion happened as the plant was going into shutdown. Until 24/7 monitoring with 3D TRASAR Technology, the plant did not know the adverse effect of shutdown procedures and quickly amended future practices to minimize corrosion upsets.

If not identified in real time and quickly resolved, these acidic events could have significantly increased corrosion in storage tanks and rail cars. One major stress event can result in major corrosion damage. To illustrate, for UAN solutions the mild steel corrosion rate at a pH of 7.0 is around 1 to 2 mpy. However, at a pH of 2.0, the corrosion rate is 60 mpy or higher; even worse still if localized pitting occurs.

3D TRASAR Technology provides a step change in UAN corrosion management by monitoring your system 24 hours a day, 7 days a week, 365 days a year, and, detecting variability that impacts product quality, asset protection, and profits.

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