NALCO 3D TRASAR®
for CRUDE OVERHEAD SYSTEMS
Delivering Corrosion Control to Protect Your Assets
Nalco Delivers Best in Class Corrosion Control

The right chemistry, in the right quantity, at the right time

Nalco 3D TRASAR for Crude Overhead Systems

Nalco leads the market in helping refiners meet their corrosion control goals. 3D TRASAR for Crude Overhead Systems (3DTCOS) is a patented new technology that combines an automated analyzer, Pathfinder® (suite of chemistries and predictive simulation software), and experts to deliver real time overhead corrosion control. This new program allows the right amount of chemistry to be delivered at the right time by automating best practices. Through technologies like 3D TRASAR for Crude Overhead Systems, Nalco helps global refiners improve their:

- Safety
- Operational Reliability
- Total Cost of Operation
- Environmental Sustainability

Your Goals are Our Goals

With Nalco as your partner, you receive a comprehensive solutions approach that aligns with your short and long-term goals. The Nalco offerings are backed by state of the art research and technical support facilities throughout the world.

Highly trained field service professionals will ensure program optimization and maximum value delivery through onsite technical support and troubleshooting.

Main benefits of 3D TRASAR for Crude Overhead Systems:

- Crude unit reliability in real time
- Overhead monitoring 24 hours a day, 7 days a week
- Automated control of filmer and neutralizer
- Automated control of caustic
- Improved reliability and uptime
- Allows greater operational flexibility

Crude Unit Reliability – In Real Time

In the refining industry, 90% of crude overhead corrosion occurs during 10% of operating time. Changing operations and crudes can lead to overhead corrosion challenges. Traditional approaches to corrosion monitoring can easily miss problems that occur during this narrow corrosion window, or they may detect problems only after significant damage has already occurred. Respond to changes faster and improve crude unit reliability with real time information using the Nalco 3D TRASAR for Crude Overhead Systems program.

<table>
<thead>
<tr>
<th>TEST</th>
<th>INDUSTRY CURRENT PRACTICE (freq/yr)</th>
<th>3DTCOS (freq/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>1,460 to 3,650</td>
<td>52,560</td>
</tr>
<tr>
<td>Wet Chemistry (Cl,Fe)</td>
<td>52 to 260</td>
<td>8,760 to 52,560</td>
</tr>
</tbody>
</table>

Testing Frequency of Traditional Approaches Versus 3D TRASAR for Crude Overhead Systems
Nalco 3D TRASAR for Crude Overhead Systems

Upper Cabinet

Lower Cabinet

Reagent Storage

Sample Conditioning System

Intrinsically Safe Heater

Analyzer Section

Emergency Stop

Purged Back Cabinet

Waste Collection Gutter

Waste Container

X-Purge Outlet

Power On Beacon

HMI
3D TRASAR Technology for Crude Overhead Systems – Automated Analyzer

The Nalco 3D TRASAR Technology for Crude Overhead Systems analyzer is designed to automatically interrogate and analyze the corrosive environment of the Crude Distillation Unit (CDU) overhead process water. This allows you to draw correlations between system changes and unit performance. The analyzer measures the pH, chloride, and iron concentrations of the overhead condensing water. Once pH, chloride, and iron concentrations have been determined, the analyzer is capable of adjusting, in real time, the chemical treatment program.

The data is graphically displayed on the analyzer main control and display panel providing easy access for field and operations personnel. The data is also pushed to a PI historian, where customers and operating personnel can easily access the data at any time via a secure internet connection. A live service report is available with the current performance information with the ability to historically trend all relevant parameters. Corrosion probe data can also be integrated into the system so all information can be found in one place.

Each analyzer comes equipped for two modes of operation, Monitoring Mode and Full Control Mode. In Monitoring Mode the analyzer captures, interprets, and stores data, and the results are displayed in real time. This allows system changes to be seen instantly, versus the time lag associated with manual field tests. See example graph of the analyzer chloride test data compared to the manually collected data. Manual adjustments can be made to the chemical program or operating conditions if necessary based on this data.

In Full Control Mode, the analyzer has the ability to automatically control the addition of sodium hydroxide (caustic), neutralizing amine, and filming inhibitor to meet the demands of the system. This is designed to feed the right chemistry, in the right quantity, at the right time thus mirroring variations in unit performance and compensating for variability in demand. This is a departure from the current practice of flat baseline feeding of chemical where...
constant under or over dosing takes place. Control is achieved through the integration of a commercially available P&ID controller, and the control logic is custom designed for each location. Each customer’s control parameters, limits, and system requirements are defined and tested well ahead of instituting Full Control Mode. Results clearly show that improved performance can be achieved.

Main benefits of 3D TRASAR for Crude Overhead Systems Analyzer:
- Maintains pH, chloride control, and iron within control limits
- Improvement in corrosion performance at a lower cost
- Constant supervision of the conditions of your overhead system
- Allows greater control and flexibility when processing challenging crudes
- Reduction in Total Cost of Operation
Since introducing the first organic neutralizing amine to a crude unit overhead system in 1968, Nalco has led the industry in crude unit corrosion control. Nalco has a full product line of neutralizing amines and filming inhibitors that allow the right chemistry to be selected for your overhead conditions. When these patented chemistries are combined with onsite expertise, Pathfinder simulation software and 3DTCOS, best in class performance for your overhead is achieved.

Corrosion control chemistries are formulated to address specific corrosion problems unique to each crude unit. Many parameters related to the behavior of the amines and the amine salts are used to identify new neutralizing amines and design blends of various amines. New information on salt formation, pH profile, and corrosivity has resulted in the formulation of a complete product line to meet the unique needs of your refinery. Corrosion control chemistries are only recommended after information related to each unit is evaluated by our corrosion control experts.

Main benefits of 3D TRASAR for Crude Overhead Systems - Pathfinder Corrosion Control Chemistries and Simulation Software:

- Full product line specifically tailored for the conditions of specific crude unit
- Best practice application and product selection
- Allows production of problematic crudes at higher levels
- Allows decrease of caustic injection
- Allows smoother operation of the crude unit
3D TRASAR Technology for Crude Overhead Systems – Technology Experts

As a leader in overhead corrosion control, Nalco has technical experts available to support you with your short and long term goals. 3D TRASAR Technology for Crude Overhead Systems was developed by researchers at Nalco that focus on your corrosion control goals.

Our Onsite Experts will work with you to understand your corrosion control challenges and help determine if 3D TRASAR Technology for Crude Overhead Systems is the right solution to help meet your needs. Our Onsite Sales engineers utilize the vast experience of our Technical Experts, Researchers, and Global Processes to help deliver a sustainable and safe solution.

Main benefits of 3D TRASAR for Crude Overhead Systems Technology Experts:

- Onsite experts who understand your corrosion control challenges and will help implement the correct solution
- Global technical experts with an average of over 20 years of industry experience provide support with their knowledge from hundreds of sites
- 3DTCOS is developed by researchers focused on industry challenges and solutions

More often than not, chemistry is used as a band aid to a more chronic issue. Identification and resolution of the issue can reduce the total cost of operation.
Delivering Value in Your Downstream Operation