



# Gas Treating Products & Services

## CASE HISTORY

### System Cleanup with UCARKLEAN™ Solutions Results in Trouble-free Amine Conversion and Startup

#### The Problem

A large, integrated refinery had converted a main H<sub>2</sub>S removal unit from MEA to an MDEA-based formulated solvent because of safety concerns about stress corrosion cracking with MEA, and to increase capacity within the existing equipment. It was recommended that the unit be thoroughly cleaned prior to startup since solids and sludges remaining in the system would adversely impact the performance of the unit. However, the unit was not cleaned before charging with the new solvent. When the unit was restarted, there were many operating problems that were directly caused by the foulants left in the system. The major problem, excessive foaming, led to the loss of the entire amine solution inventory in less than one month.

When this refiner converted a second MEA system to UCARSOL™ HS-101 solvent, The Dow Chemical Company's Gas Treating group offered UCARKLEAN™ AC and DS solutions to clean the equipment and piping of solids, scales, and residual hydrocarbons so that high solvent losses would not occur. The refiner accepted the offer and decided to use plant personnel to do the actual work. Dow's personnel surveyed the plant and made recommendations concerning which lines to blind, where

additional drain points were needed, and assisted in developing the necessary work plan. When the work was scheduled, Dow personnel were on-site to provide technical assistance.

#### The Treatment

The refiner had drained the MEA and rinsed the system thoroughly. UCARKLEAN solutions do not require prediluting prior to exposure to the equipment and piping. Before adding UCARKLEAN AC and DS solutions, the amine system was filled to volume with water and heating/circulation was established. Enough water to accommodate the volume of UCARKLEAN AC and DS solutions was drained. The UCARKLEAN AC and DS solutions concentrates were pumped into the sump then pumped into the amine system by the sump pump.

After addition of the two cleaning chemicals, the system was filled to volume with water and circulation re-established. Heat was continually applied via the reboiler and a solution temperature of 180°F was targeted. Before the cleaning solution reached optimal temperature (less than 1 hour), it had turned jet black from the initial light green color. Also, several leaky flanges and one leaky pipe were found. Since UCARKLEAN solutions are not active when

cold, the only action needed to repair the leaks was to stop heating and circulation. The scale/sludge present from previous MEA operations had sealed the leaks. These leaks probably would have appeared when the system was filled with the new amine solution.

Heating and circulation were re-established and continued until it was determined that no more scale/sludge was being removed. Remaining cleaning solution activity was determined with simple pH test strips. (When the pH of the cleaning solution exceeds 8.0, the solution is expended.) Since UCARKLEAN AC and DS solutions can be treated in most wastewater treatment facilities, the spent cleaning solution and rinses were drained to the sewer. It is very easy to determine if the cleaning solution has been completely rinsed when UCARKLEAN AC and DS solutions are used. This is important because residuals of any cleaning agent could adversely impact the operation of an amine solution.

After rinsing was completed and leaks repaired, the unit was filled with UCARSOL HS-101 solvent and was placed on standby until needed.

Startup was—as expected—uneventful.

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