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**Question 43: Have you experienced high corrosion rates in carbon steel piping in resid service operating below 500°F? Please comment on corrosion mechanisms.**

**RALPH WAGNER** (Dorf Ketal Chemicals LLC)

High corrosion rates have been experienced in heavier streams, like RCO (reduced crude oil) and vacuum residue operating at a temperature of 450 to 600°F. The role of naphthenic acid corrosion is difficult to determine in such streams with respect to the TAN (total acid number) distribution, temperature and velocity. The key precursor is sulfur species which causes “sulfidic corrosion” in such residue streams. The API subcommittee on corrosion and materials (RP939C) provides guidelines for avoiding sulfidation/sulfidic corrosion failures below a temperature of 500°F. Dorf Ketal’s organophosphorus sulfur chemistry in the TANSCIENT™ product line has been successful in significantly reducing the corrosion rates in the vacuum residue stream.

**DENNIS HAYES** (Nalco Champion)

Between about 400°F and 500°F, it is possible to have corrosion due to naphthenic acid attack on carbon steel surfaces.

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