
Question 41: What effective practices do you deploy to improve the removal of inorganic contaminants in crude such as iron and calcium? What has been the industry success rate with these practices?

BRANDON PAYNE (SUEZ Water Technologies & Solutions)

Cracked feedstocks can be introduced into the crude unit from several sources; the most common of which in North America are diluted bitumen from Canadian sources, diluted crude oils from South American sources, and slop streams from cracking units onsite that are recycled into the reprocessed slop oil blended into the crude unit feedstream. Asset operators have experienced unanticipated issues due to the reactive nature of these cracked stream components in previously unanticipated areas of the unit.

Fouling in the crude unit preheat train and the fouling of distillation column sections are common consequences of the introduction of cracked stocks in the unit feed. Due to the nature of the contaminant (i.e., recoverable hydrocarbon), adjustments in desalting practices will not remove or affect the behavior of these materials in the preheat train or distillation column. Additionally, traditional crude preheat antifoulant treatment chemistries are generally designed to disperse precipitated particulates, not address the polymerization issues associated with cracked materials. Depending on the boiling range of the cracked stocks, fouling could occur in sections of the distillation column where fouling had not previously been a concern. However, there are several practices that can be implemented that will aid in the mitigation of these potential issues when the need to process cracked hydrocarbon feedstocks arises.

The first suggested mitigation is the segregation of cracked material whenever possible. The ability to tightly control the introduction of this material to the unit is critical in managing its detrimental effects in unit equipment. If complete segregation is not reasonably achievable, the second suggested mitigation is to minimize the volume of reprocess ("slop") material that will be contaminated with the cracked stocks. (It will prove to be a significantly more manageable issue to deal with 3,000 barrels of contaminated material than 75,000 barrels of contaminated material.) A third suggested mitigation is the routing of cracked stocks to an appropriate secondary processing unit instead of routing to the crude slop oil system. This will minimize the unintended fouling of the crude unit equipment. A fourth suggested mitigation is the implementation of a robust antifoulant treatment program that will address potential polymerization issues resulting from the processing of cracked materials. If an antifoulant chemical treatment program is in place, ensure that the treatment protocol addresses the polymerization potential and monitor accordingly.

DENNIS HAYNES and **CHRISTIAN LEEDLE** (Nalco Champion)

There have been successful applications in the desalting process to remove iron and calcium to varying extents. The ability to remove either of these contaminants depends upon their form. Some methods of

removal may include pH suppression of the desalter wash water, elevated wash water rates and optimization of mud wash practices, application of solids wetting chemistries, and may also include, in some limited cases, extraction of a portion of interface has been used to minimize iron and calcium containing solids. The method used depends on the element being removed (iron or calcium), the form it is in, and the amount that is targeted for removal. Generally, for calcium (in the form of calcium naphthenates), the removal rate may be as high as 80-90%. For iron, the removal rate varies depending on the technology applied; it may be 20-50% in some cases, but with enhanced methods may be as high as 90%.

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