

Refinery wastewater treatment

Increasing plant reliability



What would it mean to your bottom line if you could improve plant reliability by making your wastewater facility more effcient?

Increase plant reliability with dynamic Wastewater treatment

Today's increasingly complex crude oil blends and higher throughput rates are creating an associated increase in contaminants and solids concentrations, adding new stresses to aging wastewater treatment plants worldwide.

Increased concentrations of contaminants, such as oilentrained solids, phenols, sulfides and heavy metals are creating new operational bottlenecks. Many who could achieve adequate liquids/solids separation five years ago are now threatened by increased environmental regulatory fines, elevated costs from reduced wastewater system performance, depressed revenue from lower plant throughput or even refinery shut-downs.

Baker Hughes wastewater treatment experts, focused on the hydrocarbon-processing industry, will help to keep you on track. We'll not only optimize your wastewater plant's efficiency, we'll treat process effuent before it gets to the wastewater treatment plant to derail potential upsets.

Through our predictive and proactive treatment approaches, expert equipment and operational recommendations, you will increase your refinery's reliability by:

 Removing profit-slashing wastewater treatment plant bottlenecks

- Preventing costly wastewater treatment plant upsets
- · Achieving or maintaining environmental compliance

Remove profit-slashing wastewater treatment plant bottlenecks

Many sources of organic and inorganic contaminants end up at the wastewater treatment plant: cooling tower blowdown; storm water; and process stream effuent from coker blow-down, benzene removal units and wet-gas scrubbers, to name a few. If too many oil-entrained solids from desalter effuent enter the wastewater treatment facility, effective oil and water separation processes cannot keep up with the required pace. This bottleneck results in the wastewater treatment plant dictating throughput and profts. Baker Hughes applies specifc knowledge, experience and carefully considered treatment approaches so bottlenecks are either quickly eliminated or avoided altogether.

Case history:

A large, independent refiner processing heavy Canadian crude oil was challenged by insuffcient primary treatment at their wastewater treatment plant (WWTP). High oily water concentrations were entering the aeration basin, where effuent ammonia levels, targeted for 1 ppm, had spiked to 23 ppm. Desalter wash-water rates and mix-valve settings were altered to reduce oily water concentrations. This operational constraint quickly transitioned into costly crude unit reliability problems. To remove this WWTP bottleneck, incumbent chemical program changes were made, especially at the Dissolved Air Flotation (DAF) unit. New chemical treatment designed specifcally for DAF solids and oil removal immediately helped stabilize aeration basin microbial activity. Ammonia concentration dropped to below 1 ppm. Previous record-time ammonia breakthrough was 245 days. With now well over 365 days since treatment began, there have been no ammonia-level breakthroughs.

Prevent costly upsets at the wastewater treatment plant

Every process crude oil slate change contributes a different set of contaminants and solids to your wastewater treatment facility. The key is to be able to predict what impacts these changes may have on your wastewater operations so you can prevent potential performance disruption. By understanding and working with the various process streams, Baker Hughes can troubleshoot existing equipment configurations, make operational suggestions and deploy chemical treatment programs to help you achieve maximum wastewater system performance.

Predictive study:

A global, fully integrated energy company was having problems at one of its US refineries with its crude oil blend iron concentrations. Baker Hughes developed an innovative chemical solution to remove iron in the desalter process. A key issue was whether or not this new chemistry, as part of desalter effuent, would impair microbial activity at the WWTP. A respirometry laboratory study was performed to help predict any negative impacts. Oxygen uptake was measured by subjecting microbial samples, taken from the WWTP, to various field-simulated conditions. Results showed no negative impact or reduction in oxygen uptake. This predictive, screening study allowed the customer to move forward with a field trial to resolve iron-concentration challenges in their crude oil blends.

Achieve or maintain environmental compliance

A wastewater treatment plant operates as a process unit. It is basically a once-through application with fluctuating inputs. In order to achieve and then maintain environmental compliance, you need rigorous monitoring and control. You also need system flexibility that can respond effectively



to changing conditions. We offer dynamic wastewater treatment programs and expertise that can minimize your environmental and liability risk, maximize system performance and return cleaner water to the environment cost-effectively.

Case history:

Baker Hughes was asked to design a wastewater treatment program for a large, independent refiner during a shutdown. During a previous turnaround, the WWTP experienced significant oily solids overloading, resulting in effuent permit violations and fines, and added operational and disposal costs to divert wastewater to storage tanks. For this shut-down, Baker Hughes focused on two waste streams, the API separator and the WWTP effuent. API effuent was mixed with other difficult-totreat water streams coming to the WWTP from the turnaround. Therefore, API effuent had to be well below plant effuent targets to ensure overall HSE compliance. Baker Hughes used a three-part treatment regime consisting of: lab simulations to anticipate oil and grease concentrations to determine the best chemical treatment ahead of time; equipment recommendations to optimize oil and grease removal; and 24/7 manpower coverage during the five-day turnaround to ensure optimum results. Oil and grease concentrations remained below the 100 ppm target the entire time. The refiner saved from \$300,000 to \$500,000 USD in fines and anticipated wastewater re-processing charges.

Let Baker Hughes expertise makes the difference

From the API separator to final filtering and dewatering, we have the programs and expertise to help your wastewater treatment plant operate the way it was designed, no matter how challenging the crude oil slate or throughput objective. We'll also treat process unit effuent before it becomes a problem at the WWTP.

We look forward to making a difference to your bottom line through increased plant reliability. Count on our dynamic team and wastewater treatment initiatives to make your wastewater facility more efficient. **Call Baker Hughes today.**





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Examples of refinery process water streams that challenge wastewater treatment plants



Wastewater plant treatment areas within a typical refinery





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