

Improving the Performance of Oil/Water Separators

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Oil/water separators are frequently used in rail yards to separate used oil from waste process water streams in order to recycle the oil. Oil/water separators can be fabricated of below-ground cylindrical steel tanks, above-ground rectangular steel tanks, or reinforced concrete tanks. They can be sized using the design parameters established in API Publication 421, Design and Operation of Oil-Water Separators, or using proprietary design parameters established by tank manufacturers. Tank internals can consist of slanted baffle plates, chain and flight collector mechanisms, or nothing at all. An essential piece of equipment in any oil/water separator is a properly designed oil baffle which is used to trap floating oil to facilitate the removal by the oil. Trapped oil is typically removed using rotating skimmer pipes, belt skimmers, or tube type oil skimmers.

At a rail yard in Pennsylvania, Norfolk Southern Railway Company (NSRC) recently completed the conversion of a rectangular, above-ground, steel “frac” tank with under/over baffles, to an API oil/water separator tank. The existing tank had overall dimensions of 24 ft. x 8 ft. x 7 ft. deep. The last 8 ft. of tank length is used as a wet well for transfer pumps, leaving about 16 ft. of tank length for oil/water separation. The tank was analyzed according to API Pub. 421 and it was determined that the optimum flow through the tank was 100 gpm. A new submersible chopper pump was installed with a capacity of 100 gpm to feed the API tank. The original “under baffle” was removed and replaced with a series of four (4) vertical 4-inch pipes and discharge elbows in front of the original “over baffle” which was sealed to force the tank effluent through the riser pipes. Trapped oil was collected and removed using the existing floating Megator oil skimmer and pump.

At another rail yard in Pennsylvania, Norfolk Southern Railway Company (NSRC) is modifying a conventional API oil/water separator tank having dimensions of 96 ft. x 12 ft. x 5 ft. deep. Oil is collected in the tank using a chain and flight oil collection system and was removed using a manually operated, rotating 8-inch skimmer pipe. A 1.5 ft. deep oil baffle plate was used to trap floating oil. Tank modifications consist of replacing the existing oil baffle with one that is 4.25 ft. deep, and replacing the rotating skimmer pipe with two (2) drum skimmers (one drum skimmer is redundant). The drum skimmers will be automatically controlled by an oil layer thickness sensing system. In order to improve the performance of the drum skimmers during the winter months when water temperatures are lower, four (4) 12 kW immersion heaters will be installed just upstream of the drum skimmers to raise the temperature of the water and skimmed oil in order to improve the oil removal efficiency of the drum skimmers.

In both of the above cases, operation and maintenance of the existing oil/water separation systems has improved allowing the WWTP operators time to focus their attention on other important treatment systems within their respective WWTPs.
