Oil Skimmers Key to Refinery Anti-Pollution Plan

At a Texas petrochemical refinery, the addition of oil skimmers from Abanaki Corp. has improved the cleanliness and efficiency of the plant's wastewater treatment process.

Because the refinery operates within strict environmental guidelines, the skimmers play a key part in its Pollution Prevention Program. What's more, the company estimates that the oil skimmers will pay for themselves in less than two years, and save more than $2,000 per year thereafter by eliminating the cost of wastewater disposal.

Weighing the Alternatives

The plant maintenance managers decided on oil skimming after considering several approaches. Doing nothing was not an option because the water cannot be discharged into the sewer without risk of fines from the EPA, the Texas Commission on Environmental Quality or the municipal sewer authority.

The alternatives to oil skimmers did not make economic sense. Sand filters have high maintenance costs because sooner or later the sand must be replaced and disposed of as toxic waste. Letting free oil get through to the sand filters would shorten filter life considerably. The costs are high with absorbents as well. They need to be continually replenished and then disposed of as solid hazardous waste.

After settling on oil skimming as the most cost-effective means to remove oil from

wastewater, the managers had to choose from three types of oil skimmers: drum, tube and belt. Drum-type oil skimmers are designed for a heavy capacity that was not needed. Tube skimmers are popular because the tube floats are on the surface and because they work in very shallow water.

In this case, however, a belt skimmer was chosen because, unlike tube skimmers, belt skimmers offer a wide choice of skimming media that can be matched to the application. One of the managers was familiar with belt skimmers at a previous position and was convinced that they would work well at this facility, so two stainless-steel Model 8 oil skimmers with a 40-GPH capacity were selected from Abanaki.

How the Oil Skimmers Work

On-site reclamation takes place in two outdoor pits and is made possible in part by the two Model 8 oil skimmers, which prevent the accidental discharge of product to the sewer. The oil skimmers work by utilizing the basic physical principles of surface tension and relative density. As the rotating belt turns, it passes through the floating layer of oil at the surface. The oil sticks to the belt, as it is more oleophilic than water. The oil is then drawn across the surface of the container as the product near the belt is removed. This same process removes any floating hydrocarbon, including gasoline and other light fuels.

Mounted over a pit, the oil skimmers drive the belt with a 1/4-HP motor. Being relatively simple devices, they require almost no maintenance and are built to provide many years of reliable service.

The refinery required skimmers constructed of stainless steel because of the nature of some of the organic compounds being manufactured in the facility. Because these products are not oil, belt selection was a carefully controlled process involving the testing of samples provided by Abanaki.

After the maintenance department evaluated the pickup rates and estimated life spans of four different materials, the looped fuzzy belt was selected for its superior performance with these chemicals. The fuzzy belt has dramatically more surface area than typical smooth belts. It is covered with synthetic "hairs" to pick up thin hydrocarbons at a rate similar to picking up motor oil with a standard belt.

Given the volatile nature of a refinery, explosion-proof motors and electrical controls were supplied for these skimmers. Drum shut-offs ensure that, even if not checked regularly, the collection container does not over flow. This allows minimal maintenance and supervision over the skimming process.

Cleaner Wastewater & Lower Costs

The units have been in place for a few months, and both management and the maintenance employees have expressed great satisfaction with the skimmers’ performance. That's not surprising - since the refinery will recoup the investment very quickly.

The alternative solution of hiring a sucker truck to empty the dirty sumps is typically $600 to $700 per visit. When mixed with water, many organic compounds are also considered hazardous waste, which makes disposal expensive and difficult. The Model 8 skimmers have eliminated that step and allowed materials to be recycled on site, saving money in both disposal and raw material costs.

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