Spring cleaning for crude oil tanks

A case study from Kazakhstan illustrates why a complete system solution is the best approach to crude oil tank cleaning. By Nils Engelke.

Environmental protection is all the rage these days. One of the biggest challenges here remains the separation of fossil fuel. Although in the UK the trend is declining, the consumption of oil is still around 1.5 million barrels every day. The need for big oil tanks is still there, as the demand remains very high. The reason for tank cleaning is fairly simple. Crude oil tanks need to be checked on a regular basis for their state of repair. In addition to this, static deposition leads to a growing amount of solid phase settling on the bottom of the tank. The capacity of the oil tank is therefore steadily reduced. To be able to separate the oil sludge into its components requires a supplier of high-quality separation systems, such as Flottweg SE.

Project Uzen

In 2005, a Kazakh company hired Flottweg to undertake a cleaning process for several crude oil tanks. A team of project engineers made the journey to Uzen in Western Kazakhstan. The team brought a complete system solution for this task with them. It included pumps, a steam generator, two reaction vessels, a control cabinet/electrical room, a machine container, a product feed container and a chemical treatment container.

The treatment of crude oil tanks requires a number of different systems. First of all, the tank is emptied as far as possible. To make the solid phase suitable for pumping it is then mixed with crude oil. After that, agitators with hydraulic gear are mounted to maximise viscosity.

The Flottweg containerised solution including control cabinet, machine container and product feed container.

The separation process is started using a heat exchanger and a feed pump. This is done using centrifuges. Flottweg's Tricanter was developed specifically for oil sludge processes and permits continuous three-phase separation. The two liquid phases are then directed into the phase tanks after separation. The solid is conveyed by a scroll out of the Tricanter and directly into containers or, using trailers, to a waste disposal installation.

The tank must be completely emptied and cleaned before inspections, maintenance or repair work. Depending on the size of the tank, there can be a residue of up to 1,000 tonnes that has to be disposed of. Alternatively, the residues containing oil from cleaning crude oil tanks can be processed using the Tricanter. This involves recovering a large part of the oil, the water can be sent to the sewage treatment plant and only about 10% of the original quantity remains to be incinerated.

The advantages of processing the residues containing oil from the cleaning of crude oil tanks are as follows:

- 90-95% of the oil contained in the residue is recovered as crude oil. This makes it possible to recover a large part of the tank cleaning costs.
- The separated solid is only about 10% of the original amount of sludge – equating to a significant reduction in incineration costs.
- The solid can be sent to landfill, as well as being transported and incinerated without posing any significant environmental hazard. This reduces transport and landfill costs enormously.
- Automatic and continuous operation reduces use of personnel, even when the oil sludge has a fluctuating composition

The process of cleaning crude oil tanks is an absolute must from the point of view of protecting nature. Just one drop of oil is all it takes to contaminate around 600 litres of water. High purity of the oil and a dry solid phase are just as important as clean wastewater. Safety aspects are also very important. A project such as the one in Uzen is associated with many different factors and choosing a reliable partner is crucial for success. ■

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