Analyses Information Sheet

75/17 75TK109D Sludge

23 September 2021

Originator: Janine Lourens

Background

Tank 75TK019D in Voorbaai needs to be emptied and cleaned. The tank bottoms consist of a thick waxy heavy hydrocarbon sludge mixture that is difficult to remove during the colder winter temperatures. The vacuum truck was halted at a sludge level of 150–200mm. The mixture is not homogeneously spread as some areas flow slowly and some areas consists of congealed clumps of wax. Figure 1 and 2 show the sludge mixture in the tank.

Figure 1:

Figure 2:

Visual analyses

The sample consists of a dark brown viscous waxy hydrocarbon mixture containing congealed waxy portions.

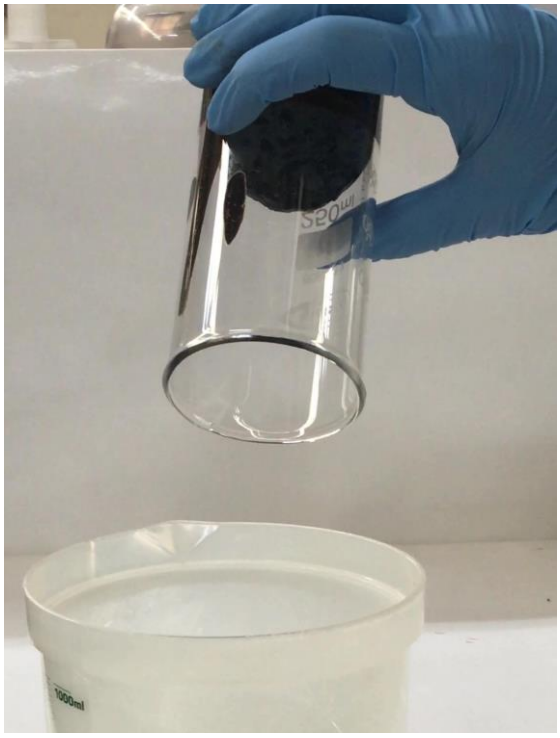
The Laboratory received two samples: (Figure 3) Monday 13 September 2021 and 22 September 2021. The two samples were very similar, but the 13 Sept. sample was less viscous and the 22 Sept. sample was somewhat more viscous consisting of chunks of soft wax and a little amount of free water.

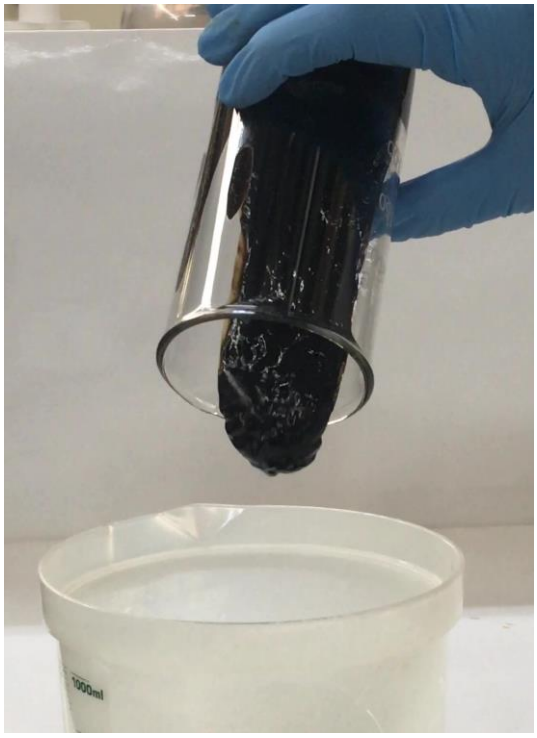
Experimental: 13 September sample

Figure 3: 13 September sample that was runny at a temperature of 12°C.

When a smaller sub-sample was left on the laboratory bench at temperatures dropping to 8°C at night, the sample appeared congealed in the morning (Figure 4), but did slowly flow after a while.

Figure 4: The sample seemed congealed, but was flowing as seen below after 10 seconds.





Experimental: 22 September sample

22 Sept. sample was more viscous than the previous sample and consisted of chunks of soft wax and a little amount of free water as seen in figure 5.

Figure 5:

The sample was warmed and stirred to obtain a homogeneous mixture at 50°C and received some property analyses as seen in Table 1:

When the sample was homogeneous, is was tested for free iron particulate with a magnet. Some free iron did cling to the magnet, but it was minimal. An Ash analyses was performed and the ash residue can be seen in Figure 6.

Figure 6:

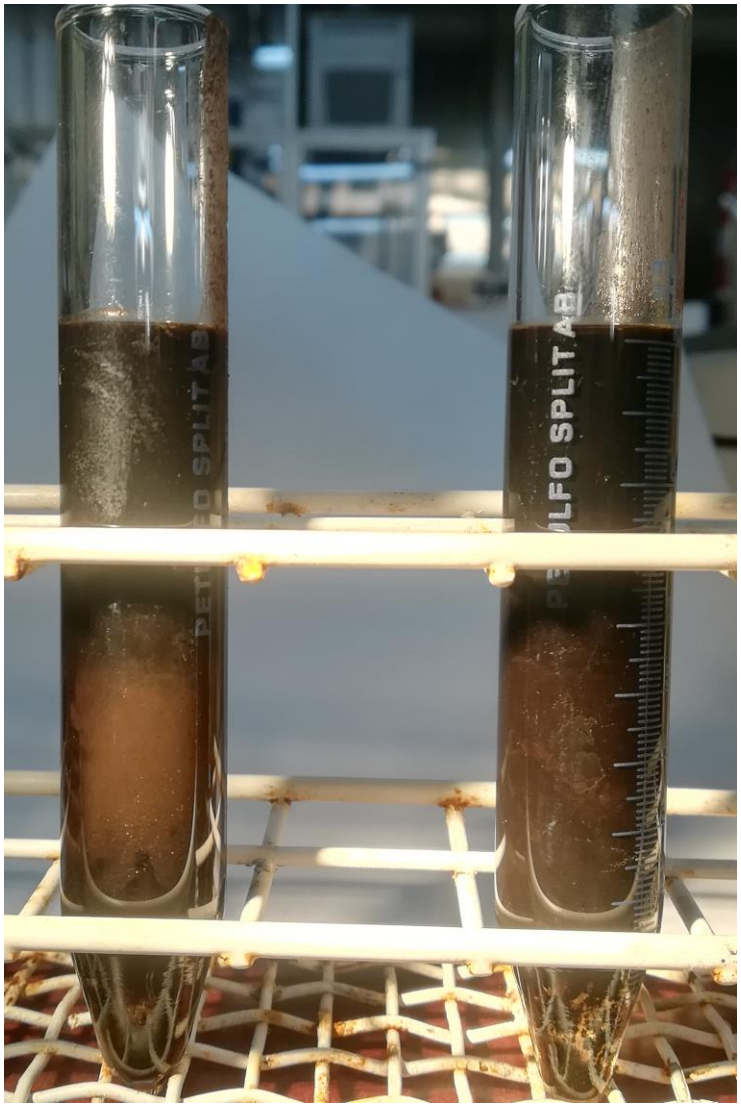
The Ash after 750°C show more non-magnetic inorganic residue than the minimal amount of iron oxide clinging to the magnet.

Property Results:

Table 1:

Properties	Result	Units
Pour Point	26	°C
Sulphur content	2327	ppm
MIT	0.97	mass %
Ash	0.56	mass%

The sludge sample was centrifuged to obtain the dispersion levels of the sludge consistency:



In the 10ml centrifuge vial, the following ratios were obtained:

- 10% water, 65% wax suspension, 25% oil

Conclusion

The sludge in 75TK109D consists of the settled bottoms of crude condensate.
The sample has a Pour Point (PP) of 26°C and will congeal at temperatures lower than the PP or will influence the flowability.

The MIT of 0.97% mass and Ash content of 0.56% mass does indicate particulate residue after ignition.
The residue consisted of some magnetic iron, but the non-magnetic share could possibly be silica based compounds.

Centrifugation presented the sludge sample with a qualitative consistency layering of 25% oil, 65% wax and a 10% water.