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TO: Jerry D. Arnold

FROM: Randy Wilson

RE: Avron Corporation proposal to break Crude Oil emulsions

Summary: Using processes that are available within the refinery at this time we could treat the oil, water, dirt emulsions of crude oil also know as rag layer for about $10.00 per barrel in chemical costs. The break out of the material produces an oil layer than has a BS&W of 0.5% or less with a layer of dirt on the bottom and an intervening layer of water. Although a significant volume of water is required the water can be reused for multiple cycles. Reusing the water also lowers the per barrel costs because the only 0.6 of the water chemical must be added to the recycle water as compared to using fresh water for each run. Problems with less than desirable agitation can be addressed by extending the time of mixing. The material does not produce foam. The process can not be over mixed causing problems.

The process: I was visited by G. K Goldman on February 7 and 8 , 2000. He brought with him his product which is a two component system A1000 which is mixed with the water before the split and 505 SD which is added to the entire mixture after the water and organic component have been mixed. Processes using these chemicals appears is *Hydrocarbon Engineering* Volume 4 number 11 pp62-66 December 1999. This article is an attachment at the end of this report. MSDS for the product are also included as an attachment.

Lab experiment #1: 200 ml of Tank 5067 was mixed with 1 ml of 505 SD and heated to 86°C (187°F). Separately 600 ml of tap water was mixed with 5 ml of A1000 and heated to 86°C (187°F). The two heated components were mixed and stired for 10 minutes at 80°C (176°F). After stiring time was completed a seperation that would be usable in the plant was seen in 10 minutes. Over a longer period more clearing of the water layer was apparent. Tank 5067 is 25% by volume water. A BS&W run and the volumes seen in the separation were identical.

Several other runs were made with Tank 5067 using different orders of putting the components together. It was found that the water, A1000, and Tank 5067 could be mixed cold, heated and then add the 505SD work a little better as well as this being a much more practical way of doing the separation in our plant.

Tank 5067. The mixture was stirred and 1 ml of 505SD was added with stirring continuing. The mixture was allowed to sit. This method does affect a good separation at room temperature 70°F, but the time for this to occur in the lab was in the range of several hours instead of minutes.

Lab experiment #3: The inital samples for tank 5058 presented for testing showed no significant BS&W. Apparently other activities that have been carried out on this tank had split out the upper layers. The tank was bomb sampled every 3 feet from the top of the fluid to the bottom of the tank. Samples from 23 ft to the bottom of 29 Ft 6 inches showed both a free water layer and a sludge layer below the water. Our splitting efforts were applied to the material below the water layer.
200 ml of the 26 ft layer (sludge) was mixed with 1 ml of 505SD and heated to 65°C (150°F). 600 ml of water was mixed with 5 ml of A1000 and heated to 65°C (150°F). The two pots were combined and 100 ml of Calumet diesel was added. The mixture was stirred for ten minutes using a magnetic stir bar and maintained between 140°F and 150°F. After stirring was completed and commercially usable separation had occured in 10 to 15 minutes. Longer separation times yield a cleaner separation.

Lab experiment #4: The remainder of all of the samples from 23 ft to the bottom were mixed for a volume of 1200 ml. To this was added 1800 ml of water and 15 ml of A1000. With stirring the mixture was heated to 65°C (140°F). When the mixture reached 65°C 6.0 ml of 505SD and 120 ml of Calumet diesel were added. Stirring was continued at temperature for 2 hours. When stirring was stopped, an oil/water separation in the 4 liter beaker occured in less than 10 minutes. The sediment took longer to fall to the bottom.

Cost calculator:

(Gallons of crude) * (0.005) * ($30.00/gallon 505SD)

FOR WATER
(Gallons of crude) * (3) * (0.015) * ($15.00/gallon A1000)

FOR DIESEL

(Gallons of crude) * (0.10)

Less than three volumes of water might be used, but the system appears to be considerably less stable. If recycle water is used the 0.015 multiplier can be replaced with 0.009 for the A1000. The 10% diesel is very necessary. Diesel is recovered when the oil layer is later processed through the crude unit.

I have been told that any residual treatment chemcial that might get back to the crude tank will

be removed at the desalter. The treatment chemcials are both more soluable in water than organic layers.

If the decision to proceed with a plant trial is made, several laboratory runs on the exact material to be split should be run. The amount of chemical will not be greater than listed above, but a suitable separation might be accomplished with less input of treatment chemcials and thus a cost savings might be available.