A High-Level Executive Summary of Cuttings Volatiles from the Great Bear Pantheon Talitha A Well, North Slope, Alaska.

Mike Smith, President AHS, 14 April 2021

Pantheon Talitha-A well cuttings' volatiles are analyzed in 238 Lab-Loaded and 178 Sealed-at-Well samples from between 6000' to 10,455' measured depth using AHS's proprietary Cryo-Trap Mass Spectrometry technology. We briefly summarize here what we consider our most important findings from this work so far. 4 sets of cuttings have been analyzed. 178 sealed-at-well cuttings from 6800 to 9736' md; 156 lab-loaded cuttings washed and dried on the rig site from 6790' to 9240' md; 20 repurposed unused backup sealed at well samples from 9280' to 9660' md; and 62 wet unwashed cuttings samples stored in plastic bags from 6030' to 6790' and from 9680' to 10,455' md. There are some differences in the analyses of the original washed and dried cuttings versus the repurposed unused sealed at well samples, and the wet unwashed cuttings samples that we have considered in making this summary this summary.

1) ***Petroleum System:*** Talitha A has drilled into a very substantial and significant petroleum system as measured by a length of 3,700' of the borehole that produced oil bearing cuttings in the zone from 6,750' to 10,455' (TD) measured depths. This zone almost certainly extends deeper than the current TD of 10,455'. It is AHS's experience that the column length of cuttings containing oil is a highly reliable indicator of petroleum system significance. The continuous 3,700' column length of oil-bearing cuttings is a more reliable measure of petroleum system significance than is the amount of oil in any of the cuttings.

   The amount of oil in cuttings is very variable due to several variables. Good quality reservoir rocks tend to lose much more oil and gas from their cuttings than do tight rocks during drilling, transport to the surface, sample preparation, and storage. More oil is lost from water wetting than from oil wetting reservoirs. More volatile oils are lost more readily than heavier oils. More oil is lost from PDC bit cuttings than from rock bit cuttings. More oil is lost from rock bit cuttings than from core. More oil is lost using OBM than WBM mud. More oil is lost from lab loaded cuttings than from sealed at well cuttings. So, the preservation of oil in drill cuttings depends on the quality of the rock, the quality of the oil, the drilling technology employed, and whether the cuttings are sealed immediately after reaching the surface. In short, the total amount of oil in any one cuttings sample is not a good measure of petroleum system strength. That all being said, many of the Talitha A cuttings hold large amounts of oil.

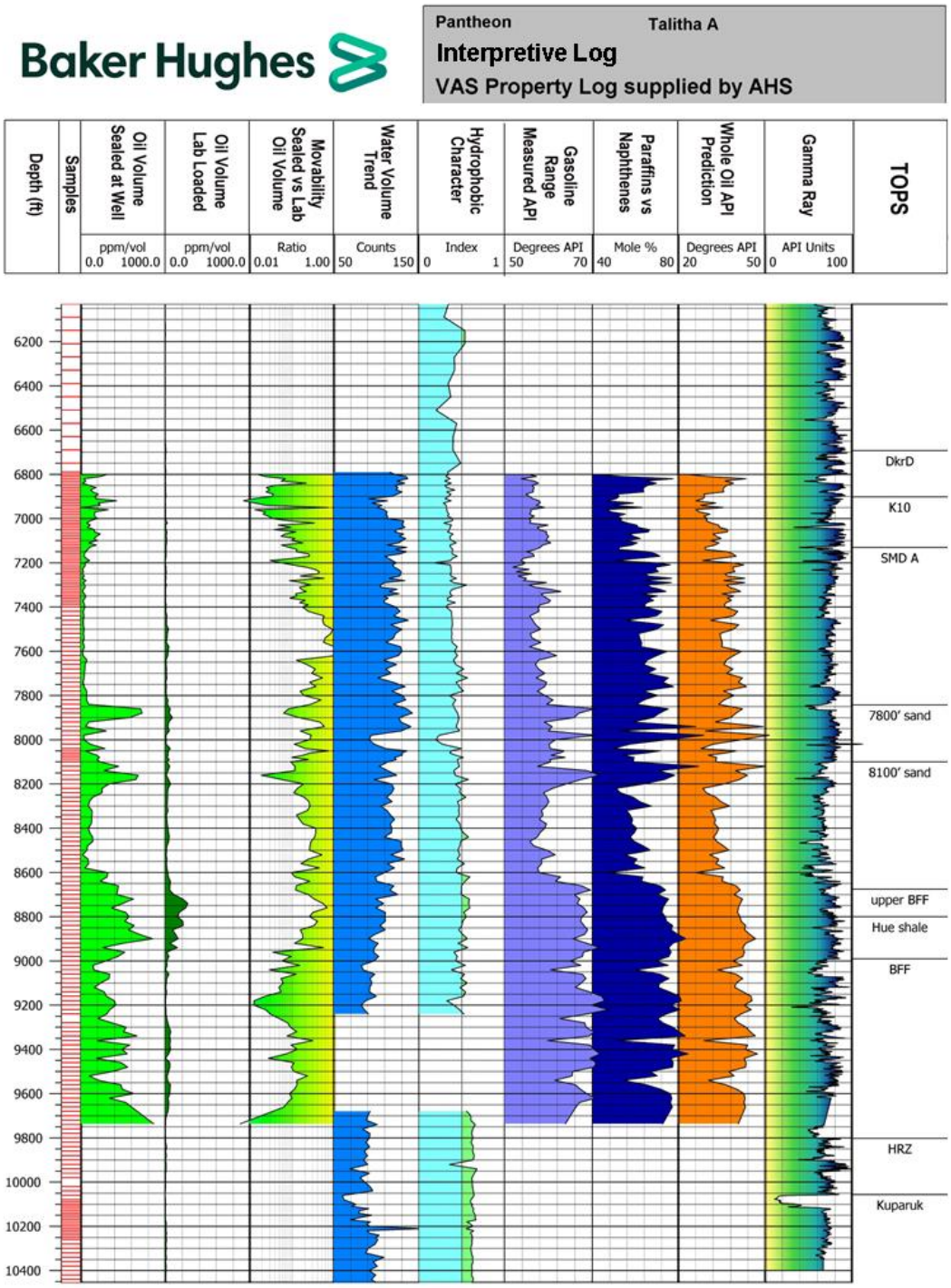
   To summarize these thoughts, an insignificant petroleum system cannot leave an uninterrupted continuous trace of 3,700' of oil-bearing cuttings. This requires a large amount of oil to have been generated, expelled, and migrated through the drilled section and the surrounding area. It is my best opinion that the 3,700' continuous column of oil-bearing cuttings, which almost certainly continues deeper than TD, is a testament to Talitha A drilling a world-class petroleum system.

2) ***Oil Quality:*** The cuttings' sealed at well volatiles paraffins and naphthenes data indicate good oil quality in the 30 to 40 degrees API gravity range for the entire oil bearing sealed at well cuttings column from 6,800 to 9,736' measured depth. As is to be expected the lab loaded cuttings show somewhat heavier residual cuttings' oil due to more extensive volatile loss, but these data are still indicative of good quality oil.

3) ***Oil versus Water Wettability:*** A unique aspect of AHS cuttings analyses is our measurement of formation water in cuttings. As opposed to oil and gas which tend to escape cuttings during transport and drilling due to large volumetric expansion of the C1 to C5 compounds, water contracts slightly in coming to the surface, so original formation water is preserved in tight spaces in rocks. These data permit us to map low-water bearing strata, and to identify oil versus water wetting zones.
Samples from 6000' to 8020' md are mostly water wetting, but become increasingly oil wetting with increasing depth. Samples below 8020' are consistently oil wetting. Samples below 9300' are strongly oil wetting, but this zone consists of the lab loaded cuttings that were not washed and dried on the rig, and the apparent change to increased oil wettability below 9300' seems related to the change in lab loaded sample types. None the less the data are consistent with increased oil wettability deeper than 8020' md. It is interesting that the top of oil wettability is the low water zone we reported between 7950' to 8050' which appears to be a tight low porosity altered ash bed. Analyses of high trans-2butene relative to total butanes indicates that drilling this hard tight zone caused significant bit burn, probably dehydrating these samples. The change in wettability at that depth suggests this ash bed is a significant seal.

4) ***Low Formation Water Zones:*** 4 zones of low formation water volumes are noted on the original lab loaded samples: 6900' to 7000' md, 7950' to 8050' md, 8600' to 8650' md, and 8875' to 9240' md. Of these low water zones our subsequent work suggests the 7950' to 8050' low water zone appears to be a tight low porosity rock and probably an altered ash bed based on other information from Pantheon. As mentioned above this zone separates the zone of mostly water wetting reservoirs above this ash bed, to mostly oil wetting reservoirs below, and thus appears to be an important seal.
The other 3 low formation water zones, 6900' to 7000', 7950' to 8050', and 8875 to 9240' are thought to be zones of higher oil saturation.
The lab loaded cuttings that were repurposed from the unused sealed at well samples from 9280' to 9660' md show high AQ2 water that is not considered reliable for formation water volume assessment.
However, the data from 9680' to 10,200' md indicate low formation water volumes which we consider indications of higher oil saturations, especially from 10,040' to 10,150'. Water changes from extremely low at 10,040', to higher but still very low at 10,150'. Although we analyzed and reported on these data blind, we are now informed that this low water zone from 10,040' to 10,150' corresponds to a high resistivity zone in the Kuparuk. As mentioned above this zone is also in the deep zone of high oil wettability.

5) ***Oil Movability:*** Between 6800’ and 9220’ md both sealed-at-well and lab-loaded washed and dried at the rig samples are analyzed. In general, lower volumes of oil are analyzed in the lab loaded than the sealed-at-well samples in Talitha A. This is an indication of overall good reservoir qualities of these rocks, as oil has continued to be lost from the samples that were not immediately sealed at the well. Of note are the samples from about 9,000’ to 9,220’ below the Hue shale as these samples show particularly high sealed at well oil, but at the same time very low lab loaded oil. These data indicate very good to excellent oil mobility for the samples from 9,000 to 9,220’ md. We interpret these data to indicate these rocks from 9000’ to 9220’ to have very good reservoir qualities.



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Baker Hughes

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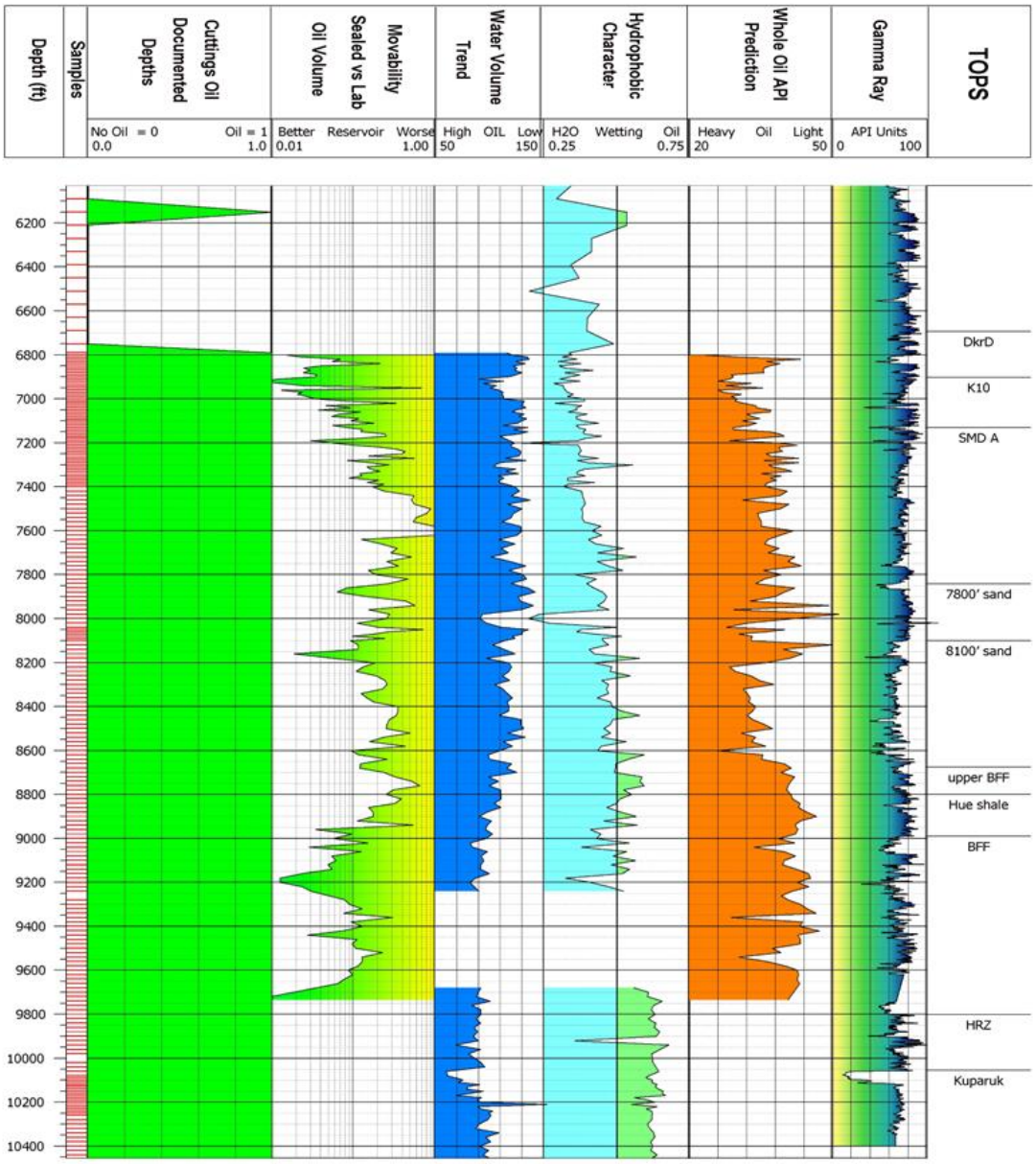
Pantheon Talitha A

Interpretive Log

VAS Property Log supplied by AHS



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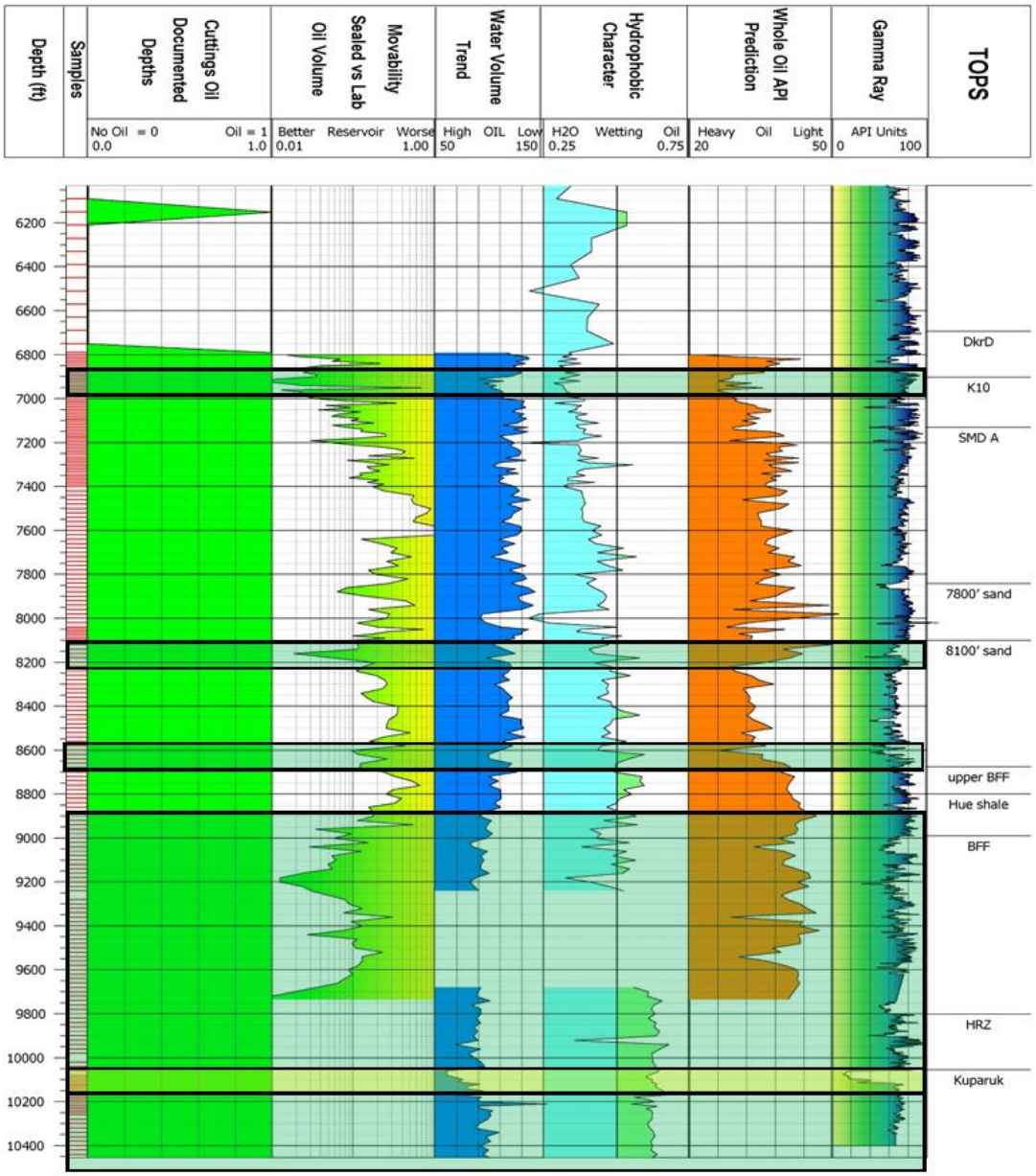

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