# CAUSAL PROTOCOLS TO ASSESS THE VIABILITY OF NATIVE STATE OR RESTORED STATE PREPARATION

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**Abstract.** Wettability is the fundamental attribute controlling reservoir fluid saturations. It is the main parameter governing capillary pressure, which determines the distribution of the fluids, and relative permeability, which describes the fluid dynamics, within porous media. It is essential that wettability in a core study is representative of the reservoir wettability and thus, one must decide whether native (fresh or "as received") state or restored state analysis should be employed. To date, there remains debate in our industry regarding which of these two conditions should be more representative: some preferring native state (as recommended by Anderson's pivotal literature survey) and others favouring restored state core procedures, since conditions can be controlled and the processes ought to be repeatable. In recent years, it has become increasingly difficult to employ bland mud systems during coring, with additives such as; asphaltic bridging agents, emulsifying agents, surfactants, etc., that will alter wettability if invading the pore space. Use of these additives does not automatically preclude native state analysis, but inevitably complicates the process.

Some might consider that native state analysis is a relatively simpler experimental method, merely performing analyses on "as received" core samples, assuming them to be representative of native reservoir wetting conditions. However, "as received" core material may not represent native state, since wettability and saturation can be altered throughout the coring, wellsite core handling and laboratory processes, which may preclude native state analyses. If determining to employ native state core analysis, it is paramount, at an early stage in the program, to assess the impact of possible changes during the coring through to laboratory processes; considering several aspects such as: core damage, potential invasion of mud additives, saturation hysteresis, compositional change of the reservoir fluids, experimental conditions, laboratory methodologies, etc.

This paper will suggest a decision tree process, using different special core analysis protocols for different coring and core handling scenarios to determine whether native state core analysis is a viable approach for each scenario and, if not, whether restored state analysis can be applied.