Sidewall Core Analysis

Question from Nate Kaleta to John Dacy at Core Labs: Texaco has supplied me with sidewall core reports and some of these were produced by Core Laboratories. I have a quick question pertaining to one of the columns of data in the analysis report. The 7th column is labeled 'PROB PROD'. I take this to be short for 'probable production'. For the particular sand I am studying, the report indicates 'COND'. Does this 7th column indicate the phase of the hydrocarbons in the reservoir or the phase at surface conditions?

Response from John Dacy to Nate Kaleta (9/21/00): Your estimate of what "PROB PROD" means is correct. To make this call, the core analyst takes into account the rock properties, permeability & porosity; textural features such as median grain size (est), sorting (est), degree of silt-shale and location (dispersed vs lam), residual fluid saturations (i.e., the surface conditions saturations), and fluorescence of the fresh core under UV light. Overprinted on all the above is the analyst's experience with the regional productive characteristics for local formations. Relatively speaking, if the core has storage and flow capacity, it could be classified as "productive". Where it is located in the reservoir column (height above free water) will control the relative amount of water and non-water (gas & oil) observed at the surface. Keeping in mind that the mud filtrate (often water, but sometimes oil) will be present in the core to some varying degree, the analyst can interpret the saturations and make the production call; for example, 0 to 3% oil and 83% water would probably be called "water-productive"; whereas ~1 to 3+% oil and ~45-55+% water may be called "condensate-productive". In the same vein, 0% oil and ~45-55+% water may be called "gas"; ~8-25+% oil and ~45-55+% water may be called "oil". The 0-3 or 5% oil sometimes observed at the surface is probably in the gaseous phase at reservoir conditions, although that cannot be certain from core data. Reservoir fluids analyses (PVT) would be needed to determine the phases present at reservoir conditions. Low oil volumes can also be classified as condensate when the fluorescence is blue-white to very light yellow as opposed to the yellow-gold fluorescence of black oil. The analyst may also use mercury penetration patterns to help make the production call. This & much of the above is discussed on pages 5-1 to 5-3 of the Core Lab manual "Fundamentals of Core Analysis" which you should have somewhere in the department. Ultimately, the productive characteristics of the interval will depend not only on basic rock properties, permeability & porosity, but also on reservoir condition rock saturations, reservoir condign fluid properties, the relative permeability characteristics of the rock, and the drive mechanism of the reservoir. "Probable Production" calls in routine core analyses are still important in some venues - they can help the company geologist-engineer decide which intervals to complete; used with log data, the geologist can make better decisions. The "calls" can be traced back to a time when core data could be all the geologist may get regarding formation characteristics. That is, logs were unavailable and/or unreliable.