Characterizing and Locating Conductive Faults/Fractures via Pressure Data

Faisal M. Al-Thawad[1], *Rashid H. Al-Obaid*[2], *Harmohan Gill*[2], *Fahad A. Al-Ajmi*[2], *Stig Lyngra*[2], *and naseem Al-Dawood*[2]. *(1) Saudi Aramco, PO Box 577, Dammam, 31311, Saudi Arabia, phone: +966-3-8728465, fax: +966-3-8728466, faisal.thawad@aramco.com, (2) Saudi Aramco, Dhahran*

This paper presents a multi-source data integration approach for the detection and location of a geological feature causing communication between two reservoirs separated by 500 feet of non-reservoir rock. The technique used involved plotting the interpreted distance to a possible conductive fault / fracture corridor established from multiple well tests to establish it's most reasonable location. The nature and extent of the feature was constrained by available image log and seismic data.

Dynamic data together with drilling information confirmed the presence of local vertical communication across a thick non-reservoir zone. An interference test indicated the communication where a pressure response in a producer in the upper reservoir was observed when changing the water injection rate in an injector in the lower reservoir. Although this data confirms the presence of a vertical communication, it's qualitative nature makes it impossible to use to characterize the location and geometry of the feature. The technique described in this paper provides a more quantitative assessment of the features location.

Inter-and intra-reservoir communication through fractures are a common feature of many oil and gas fields, however, often little or no information is available to describe the physical characteristics and location of these fractures. Circulation loss while drilling horizontal wells, together with production log and other production and pressure data provide evidence of existing conductive faults and fractures. Better reservoir management decisions and more focused development strategies can be achieved through the integration of the quantitative pressure transient analysis and integration of transient results with all other available data