



## Evolution of Cased-hole Nuclear Surveillance Logging Through Time

**Speaker:** Dale Fitz

### Abstract:

Nuclear logging techniques have played a critical role in the evaluation and surveillance of hydrocarbon reservoirs since the introduction of the gamma ray log in 1939. This presentation reviews the history of key developments in nuclear logging that led to improved methods to identify gas-oil, gas-water, and oil-water contacts in steel-cased wells as well as methods to identify gas, steam, and water flood front encroachment, calculate their saturations, and recognize problems in efficient reservoir depletion. This presentation focuses solely on nuclear methods used to directly identify fluids behind pipe using natural gamma radiation, neutron induced gamma radiation, and neutron flux measurements. This includes gamma ray, spectral gamma ray, single and dual detector neutron measurements, pulsed neutron capture, ( $\rho$ ) and pulsed neutron spectroscopy (carbon/oxygen or C/O) methods. It will not cover other methods of identifying fluids behind pipe such as borehole gravity and deep EM methods using wired pipe. It also will not cover indirect methods to infer fluid types in reservoirs such as a nuclear production logging using gamma density and pulsed neutron measurements.

### Bio:



**Dale Fitz** holds a B.S. degree in Chemistry from Oklahoma State University and a Ph.D. degree in Physical Chemistry from the University of Illinois. He joined Exxon Production Research Company in 1981 and did research on nuclear logging tool response and interpreting logs run in shaly sands. He worked for Esso Production, Malaysia from 1994 to 1997, ExxonMobil Exploration Company from 1997 to 2005, ExxonMobil Upstream Research Company from 2005 through 2009, and then again for ExxonMobil Exploration Company from 2010 until his retirement in 2015. During the last 15 years of his career at ExxonMobil he became heavily involved in production logging. He has not slowed down in any way. Since retirement he has contracted with Petroskills to re-develop and teach one of their production logging courses and has taught special advanced cased-hole nuclear logging courses for them. He is also recently been doing some contract production log interpretation work for several companies.