



## **Establishing the base of underground sources of drinking water (10,000ppm) using geophysical logs and chemical reports in the southern San Joaquin Basin, CA**

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Recent concerns about well stimulation and oilfield disposal practices has resulted in the desire to learn more about the distribution of usable groundwater that might be impacted by these practices. Waters that require protection are classified by the US EPA as USDW's (Underground Sources of Drinking Water). These waters have a concentration of 10,000 parts per million total dissolved solids and are not within an exempt aquifer. Direct sampling and chemical analyses of the water from oil and gas producing formations provide the most accurate values for the formation water salinities, but the data is scarce. The method in this analysis uses open-hole geophysical logs and Archie's equation to calculate the salinity. The two methods used in the analysis are the spontaneous potential method that uses the spontaneous potential log and the mud and formation resistivity values to calculate a salinity, and the resistivity-porosity method that uses the resistivity and porosity logs. Sonic, density, and neutron logs are available in the southern San Joaquin as well as porosity values from cores. Results shows that the resistivity porosity method has a smaller error than the spontaneous potential method, therefore, the resistivity-porosity method is chosen for the analysis of the 10,000 parts per million boundary. Due to the lack of porosity logs in wells with chemical analyses, porosity values recorded in DOGGR reports are used in the Humble equation to link the formation water resistivity to salinity. In this way, we can back calculate the deep resistivity vales that should correspond to the 10,000 salinity boundary to determine the depth at which the base of the USDW is found.