



San Joaquin Geological Society

VIRTUAL MEETING

Date: Tuesday, February 9th, 2021

Time: 6:30 PM Virtual Lecture

Place: Zoom link included in email

Our virtual lecture will be held via Zoom. Meeting link and access code to follow!

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Multidiscipline methodology for USDW determination to support well abandonments at offshore Rincon Oil Field

Presented by: Daniel Schwartz, PhD

Authors: Daniel Schwartz, PhD; Daniel E Schwartz, LLC and Driltek Corp., Terence O'Sullivan; Vapor Condensation Technologies, LLC, and Eric White; Numeric Solutions, LLC

Abstract: To develop part of the offshore Rincon Oil Field, wells were drilled from a coastal corridor in Ventura County. Abandonment of these wells required that cement be placed across the base USDW (transition from >10,000 mg/l TDS to <10,000 mg/l TDS). A blended Petrophysical / Geological approach was developed to create a base USDW surface map to intersect wells for abandonment. California State Regulations and Codes (Article 3.2. Oil and Gas Drilling Regulations 2128. Drilling Regulations); stipulate "a cement plug at least 200 feet long shall be placed across the intrazone freshwater / saltwater interface, so as to isolate fluids in the strata in which they are found and to prevent them from migrating into other strata." To determine water salinity and total dissolved solids (TDS); the traditional approach has been to utilize well logs run when the well was drilled. Commonly the Spontaneous Potential (SP) or the Resistivity-Porosity (RP) methods are used to estimate formation water salinity. In both cases, depth and log readings are needed in addition to drilling-mud properties (weight, resistivity, temperature, mud filtrate resistivity, and mud filtrate temperature), uninvaded-zone resistivity (in a wet sand) and the porosity of the wet sand are needed. Rincon wells were drilled between 1927 and 1988, and in general, digital log data was not available. Key parameters were not available for older wells, and this increases the uncertainty in salinity calculations, especially if only one well log method is used. For the present study, data was obtained from 30 corridor wells. Fifty-two SP and 54 RP readings were made from logs. TDS determinations for sample depths range from 4,000 to 40,000 mg/l with a $R2 = 0.7415$, but have a variance of 5000 mg/l to 10,000 mg/l around the 10,000 mg/l value. To generate a base USDW surface for abandonment cement placement, a four-step process was employed, resulting in a mapped surface with over 200 feet of variance in the corridor. The USDW map was overlaid with surface topography. Stream discharge appears to influence USDW distribution in the near subsurface along the shoreline. Wells of differing vintage and data quality require a more robust analysis to ensure consistent output. Mapping of statistically consistent salinity derived from both SP and RP methods improves stability, promotes the understanding of base USDW variance, and enables development of a most-likely depth-to-base USDW map that compares favorably to surface drainage patterns. When historical variations in watershed discharge are considered, there is strong support for adjusting depth of abandonment-cement placement in Rincon corridor wells.

Biography: Dan is the principal and owner of his own contract company, Daniel E. Schwartz, LLC, which he founded following an exciting career with over 40 years working in numerous basins throughout the world while at Shell and Aera. He is well known and highly respected in the San Joaquin Basin for leading various geological field trips to view outcrops of analogs to oil and gas reservoirs currently developed throughout California and offering his expertise and technical assurance for many major projects from both the Petroleum Engineering and Geological viewpoints. Dan's acumen for strategic business development, managing exploration and exploitation activities, and assessing the value of industry opportunities has allowed others to harness his knowledge through consultation and myriad publications, presentations, posters, course offerings and volunteer activities within the community. Additionally, Dan, with his wife Cynthia, is a great friend to the SJGS community, gracefully hosting our Fall Fiesta at his beautiful home, donating his time and energy to planning and leading field trips, and offering council to the executive committee when requested. In his spare time, Dan is actively involved in the vintage automobile racing association and historic motor sport association.