Abstract

As groundwater is a vital resource, it is important that oil and gas operations do not jeopardize water quality. Many consumers, including farmers and municipalities, rely year after year on the freshwater provided by aquifers. Along South Texas, oil and gas companies are targeting the Eagle Ford formation containing hydrocarbons. In this same region, the Carrizo-Wilcox aquifer must be drilled through to reach the Eagle Ford below. To protect the above aquifer, cemented surface casing is used to seal the Carrizo-Wilcox from contaminants within the well borehole. This study incorporated Geographic Information Systems (GIS) to evaluate surface casing depths of oil and gas wells, to verify if they are deep enough to adequately protect the aquifer. To understand the geologic structure occurring in this region, aquifer depths obtained from well logs were used to interpolate the base of the Carrizo Sands. After comparing three interpolation methods, the Empirical Bayesian Kriging (EBK) interpolator, using the *Exponential Detrended* semivariogram, was selected to create a predicted surface and a standard error map. Surface casing depths of Eagle Ford wells were mapped and queried to determine if they are deeper or shallower than the predicted surface representing the aquifer. Over half of the wells within the study area had surface casing shallower than the aquifer. However, most of those fell within areas where groundwater was brackish. Results from this study should motivate regulatory agencies in tightening up policies and guidelines pertaining to oil and gas operations affecting aquifers within the State of Texas. In addition, methodologies conducted during the study provide a viable means to improve the current process of determining surface casing depths.