Problems in Obtaining Hydrogeologic Information for a Rapidly Growing Suburban Region such as St. Tammany Parish, Louisiana

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St. Tammany Parish is one of the most rapidly growing areas in the Gulf coast region, yet this area has had little in the way of detailed hydrogeologic study. The parish is located in southeastern Louisiana on the north shore of Lake Ponchartrain about 30 miles from downtown New Orleans which makes it an ideal "bedroom" community for the metropolitan area. The cities of Slidell, Mandeville, and Covington are the largest urban sites in an area that has seen most of the growth occur in rural regions outside of city limits. Consequently, there is no unified approach to the development of ground water resources.

St. Tammany Parish experienced a population growth of over 30% between 1980 and 1990. If this trend continues then the last decade of this century will see a population increase of over 40,000. Increases of this magnitude will likely place additional stresses on the already rapidly developing water resources. Although the parish generally has an adequate supply of good quality water, there have been several instances of aquifers which are tapped by over 27 public and private water supply organizations all overseen by four state and several federal agencies. With this type of haphazard development and overlapping responsibilities, it is exceedingly difficult, perhaps impossible, to come up with a method of properly evaluating ground water usage.

Advanced Surface Geochemical Interpretation With Case Studies

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A combination of statistics and compositional analysis is currently being used to test the validity of surface hydrocarbon anomalies. Once the hydrocarbon anomaly is detected a rigorous compositional analysis is undertaken to ascertain its source. Some of the techniques under investigation are Factor Analysis, Discriminant Analysis, diagnostic hydrocarbon ratios, and Pixler Plots.

Factor Analysis and Discriminant Analysis are used to detect any underlying structural relationships between variables. These statistical methods simplify the interpretation by reducing the number of variables to be used in the interpretation. The resulting factors are reclassified as a function of hydrocarbon composition. The extraction of various compositional structures can show the difference between reservoir and non-reservoir hydrocarbons. Compositional grouping based on molecular weight forms the bases of the interpretation. If thermogenic hydrocarbons are present, methane, ethane, and propane form one group while the heavier hydrocarbons form a separate distinct group. Non-reservoir hydrocarbons are comingled and do not exhibit specific relationships.

Hydrocarbon ratios have been used for many years to characterize reservoir attributes. Statistically processing the raw data prior to determining the ratios can yield information not readily apparent when using simple ratios.

Pixler plots show the relationship of methane to ethane, propane, butane, and pentane respectively. When plotted in graph form, these relationships, for any particular sample, may be representative of a producing or non-producing area or an oil bearing or gas bearing area. A more generalized compositional analysis is obtained by determining the slope and intercept of the line drawn through the coordinates of these ratios for each sample, which can then be plotted in map view.