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Geohydrologic Investigation and Establishment of a Permanent Multi-Observational Well Network in Aiken, Allendale and Barnwell Counties, South Carolina -- Phase I

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ABSTRACT

Numerous investigators have described the stratigraphic column and attempted to correlate the geologic formations of western South Carolina, but a variety of geologic problems have complicated this task. Scarcity of type localities is a major problem. Not all formations are characterized by a type locality; some occur only in the subsurface, whereas others did not have a type locality designated by the originators of the unit name. Many of the exposures are of limited extent and poor quality.

The geologic complexity of the region creates another major set of problems. Deltaic and alternating marine and non-marine depositional features characterize the area. Abrupt changes in lithology occur, particularly where deltaic sediments and marine sediments meet. Some formations have been partially to totally eroded and stream channels have been filled with sediments foreign to the original depositional environment. Being situated close to the Fall Line, several formations terminate or "pinch out" in the subsurface. As the formations extend downdip, they grade both laterally and vertically into different lithologic units. Many of the formations are non-fossiliferous, making biostratigraphic and chronostratigraphic correlation a difficult, if not impossible, task.

Geophysical logs from several wells in the area are available; however, not all of them are useful in correlating formations. Log signatures may vary drastically within the same formation because of facies changes, mineralogical changes, and chemical characteristics of the water in the formation. Some logs are of poor quality and others are from shallow wells, limiting the amount of vertical data.

Another set of problems come from the investigators, many of whom, as they examine the stratigraphic column, approach it with different points of view. Depending upon their interest, different investigators will divide the stratigraphic column on the basis of biostratigraphy, chronostratigraphy, or lithostratigraphy, each likely to have different boundaries.

In addition to the complexities of the geology, the geologic community has conflicting opinions concerning the nomenclature of the formations (Table 1). Within this area, a single formation may have as many as three names applied to it. The differences in nomenclature occur not only with a single formation, but also with groups of formations. One investigator may combine

several formations described by another investigator and apply a single different formation name.

Superimposed on the problem of formation nomenclature is the problem of aquifer nomenclature. Many hydrologists are of the belief that aquifer names should reflect the names of the formations in which they occur, which often presents a problem when an aquifer transgresses several formational boundaries. Other hydrologists believe aquifer names should be separate from formation names, creating confusion when trying to associate an aquifer with its respective geologic formation.

The South Carolina Water Resources Commission (SCWRC), in its continuing efforts to acquire geohydrologic information for various areas of the state, and being aware of the deficiency of detailed geologic and hydrologic data for the area surrounding the Savannah River Plant (SRP), initiated a geohydrologic investigation in part of the Lower Savannah River Project Area. The area, consisting of Aiken, Allendale, and Barnwell Counties, lies almost entirely within the coastal plain of western South Carolina. The framework for the investigation is centered on a well cluster system, an extension of the well cluster system being constructed on the plant site as a part of the "SRP Baseline Hydrogeologic Investigation". The format of the information obtained is compatible with that of the SRP project.

The entire well cluster project, as originally proposed, consists of ten well clusters of five to ten wells at each strategically located site peripheral to SRP (Fig. 1). The location of these sites is tentative, based on limited existing data. Each site is being reevaluated as new data are obtained from each cluster. Budget constraints necessitated a modification of the original planned activities and expenditures. The Savannah River Operations Office and SCWRC agreed that coring two deep wells and completing two shallow wells annually for the first two years of the project could best use the available funds. It was decided that core holes at sites C-2 and C-6 would provide the most useful data initially.

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